

ABSTRACT

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**Vision 2047: Sustainable
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Table of Content

RECENT ADVANCES IN BIODIVERSITY AND CONSERVATION STATUS OF INDIAN FISHES	1
Dr. A. K. Pandey	1
END POINT BIO MARKERS FOR MONITORING HEAVY METAL POLLUTION IN FISHES	3
Dr. Manoj Kumar	3
PERFORMANCES EVALUATION OF SUGARCANE GENOTYPES FOR YIELD & YIELD ATTRIBUTING CHARACTERS	4
Nirmodh Prabha ^{1*} , Ravinder Kr. Sharma ² and Ruchi Sharma ³	4
ANTIMICROBIAL ACTIVITIES OF MEDICINAL PLANTS	4
*Muhammad Akram, Umme Laila.....	4
COMPARATIVE ANALYSIS OF COST, RETURNS AND LABOUR HOURS IMPACT ON PRODUCTION OF COTTON & SUGARCANE CROPS IN HARYANA WITH HIGHEST PRODUCING STATE IN INDIA	5
Dr. Vijay Kumar ¹ , Dr. Sumit ² and Dr. Joginder Kumar ³	5
THE PERSPECTIVES OF INDIAN EDUCATION SYSTEM: A CASE STUDY- OF PRIMARY EDUCATION SYSTEM IN AHMEDNAGAR DISTRICT, MS	5
Dr Misal Nivrutti Vinayak.....	5
EFFECTS OF PRE-SOWING SEED TREATMENTS WITH AM FUNGI ON THE ACCUMULATION OF SEED PROTEINS IN SOYBEAN UNDER CADMIUM STRESS	6
Amit ¹ and Yogesh Kumar ²	6
FEASIBILITY OF INTERCROPPING IN MULBERRY IN KASHMIR	6
M. R. Mir, I. L. Khan, A. R. Rafiqi, A. H. Ganie, R. K. Sharma and M. F. Baqual	6
EFFECT OF IMPROVED CULTIVATION PRACTICES ON PIGEON PEA PRODUCTION AND ECONOMICS IN VINDHYA PLATEAU AGRO-CLIMATIC ZONE OF SAGAR DISTRICT, MADHYA PRADESH	7
Mamta Singh ¹ , A. K. Singh ² and K. S. Yadav ¹	7
LOW-COST EVAPORATIVE COOLING TECHNIQUE FOR STORAGE OF POTATO, ONION AND GARLIC IN WEST CHAMPARAN, BIHAR, INDIA.....	7
R. P. Singh ¹ , S.K. Gangwar ² , D. K. Tiwari ² , Abhik Patra ¹ , Gagan Kumar ¹	7
PERFORMANCE OF EARLY CAULIFLOWER VARIETY SABOUR AGRIM IN WEST CHAMPARAN DISTRICT OF BIHAR.....	8
Dhiru Kumar Tiwari ¹ , S.K. Gangwar ¹ , R.P. Singh ² , M.S. Kundu ³ , Saurabh Dubey ¹ , Subhashisa Praharaj ¹ , Chelpuri Ramulu ¹ and Ranjan Kumar ⁴	8
ADVANCEMENT IN AGRICULTURE NANOTECHNOLOGY: A ROAD TO FUTURE.....	8
Dr. Chanchal Singh.....	8
LOW-COST EVAPORATIVE COOLING TECHNIQUE FOR STORAGE OF POTATO, ONION AND GARLIC IN WEST CHAMPARAN, BIHAR, INDIA.....	9
R. P. Singh ¹ , S.K. Gangwar ² , D. K. Tiwari ² , Abhik Patra ¹ , Gagan Kumar ¹	9
POSTHARVEST HANDLING, PROCESSING AND PRESERVATION OF FOOD.....	10
Uday Raj Gaurav, Shreya Baranwal	10
ECONOMIC ANALYSIS OF HARVESTING AND TRANSPORTATION INTERVENTIONS OF SUGARCANE IN HARYANA	11
Dr. Vijay Kumar ¹ , Dr. Sumit ² , Dr Neeraj ³ and Dr. D.P. Malik ⁴	11
AUGMENTING FARMERS' INCOME THROUGH TECHNOLOGICAL INTERVENTION: A CASE STUDY IN BIHAR, INDIA	12

Rohan Kumar Raman ^{1*} , Abhay Kumar ¹ , Ujjwal Kumar ¹ , Md. Monobrullah ¹ , D.K. Singh ¹ ,.....	12
IMPACT OF IMPROVED PACKAGE AND PRACTICES OF BOTTLE GOURD UNDER FRONTLINE PROGRAM.....	13
D. K. Tiwari ¹ , S.K. Gangwar ¹ , R. P. Singh ² , Abhik Patra ¹ , M. S. Kundu ³ and Anupama Kumari ³	13
POST-HARVEST TECHNOLOGY: EXTRACTION AND UTILIZATION OF BANANA FIBER FOR EMPLOYMENT.....	14
Gayatri ^{*1} and Sangeeta Deo ²	14
REVIEW ON THE IMMUNOMODULATORY ACTIVITIES OF MEDICINAL PLANTS	14
Rashmi and Manish Kumar	14
ASSESSMENT OF DIFFERENT CROPPING SYSTEMS AND CLIMATE RESILIENT INTERVENTIONS FOR DOUBLING FARMERS' INCOME.....	15
Dr.S.K. Rai ¹ , Dr. Vandana Kumari ^{2*} , .Dr. Leela Chauhan ³ ,Utpal Kant ⁴ , and R.K.Jha ⁵	15
ANTIMICROBIAL ACTIVITY, BIOAUTOGRAPHY ANTIOXIDANT ASSAY AND GC-MS ANALYSIS IN <i>FAGONIA BRUGUIERI</i> DC.....	15
Piyush Panwar	15
EVALUATION OF MULBERRY FRUIT OF DIFFERENT FRUIT BEARING MULBERRY GENOTYPES FOR ANTIOXIDANT ACTIVITY UNDER TEMPERATE CLIMATIC CONDITIONS.....	16
Masarat Bashir, Dar Junaid Bashir and R.K.Sharma.....	16
BIOREMEDIATION OF AGRO-BASED PULP & PAPER MILL EFFLUENT EMPLOYING AUTOCHTHONOUS BACTERIA.....	16
Ravi Sharma ¹ , Hukuma Ram ¹ , Deepasha Sahu ² , Ritesh Meel ³ , Raaz K Maheshwari ⁴	16
IMPACTS OF CLIMATE CHANGE ON THE WATER RESOURCES IN JAMMU & KASHMIR, (INDIA)	17
Ruchi Sharma ¹ and Ravinder Sharma ²	17
SPLIT DOZE APPLICATION FOR FROST MITIGATION AND YIELD IMPROVEMENT IN MULBERRY UNDER KASHMIR CONDITIONS.....	17
M. R Mir, Naveena Nazim, S.Qayoom, Farida, A. Baqual M.F. and *S.A Mir, I.L.Khan and R.K.Sharma	17
YIELD ATTRIBUTES AND YIELD OF LINSEED (<i>LINUM USITATISSIMUM</i> L.) AS AFFECTED BY PHOSPHORUS AND SULPHUR APPLICATION GROWN UNDER SANDY LOAM SOIL.....	18
Shashank Singh ^{1*} , Biswarup Mehera ¹ , Subhangi Singh ² , R. P. Singh ³ and Abhik Patra ³	18
SUSTAINABLE INCOME GENERATION THROUGH INTEGRATED FARMING SYSTEM OF FARMERS OF BHILWARA DISTRICT IN RAJASTHAN	18
C.M. Yadav ¹ H.L.Bugalia ² , K.C.Nagar ³ and P. Kumawat ⁴	18
APPLICATION OF PHOSPHORUS AND SULPHUR EFFECTS GROWTH ATTRIBUTES AND GROWTH RATE OF LINSEED (<i>LINUM USITATISSIMUM</i> L.) GROWN UNDER MIDDLE GANGETIC PLAN.....	19
Shashank Singh ^{1*} , Biswrup Mehra ¹ , Subhangi Singh ² , S. K. Singh ³ , R. P. Singh ⁴ and Abhik Patra ⁴	19
STEP TOWARDS MAPPING OF HELMINTHOSPORIUM LEAF BLIGHT RESISTANT GENES IN OATS.....	19
Harshavardan J Hilli ^{1*} and Rahul Kapoor ²	19
ZERO TILLAGE TECHNOLOGY AS A PATHWAY FOR WHEAT (<i>TRITICUM AESTIVUM</i> L.) PRODUCTIVITY AND PROFITABILITY IN NORTH WEST ALLUVIAL PLAIN ZONE OF WEST CHAMPARAN DISTRICT, BIHAR.....	20
R. P. Singh ¹ , S.K. Gangwar ² , R. K. Jha ³ , Abhik Patra ¹ , Pankaj Malkani ¹ , D. K. Tiwari ² , Gagan Kumar ¹ , Subhashisa Praharaj ² , Chelpuri Ramulu ² , Abhinav Kumar Singh ^{1,2} , M. S. Kundu ⁴ and Anupama Kumari ⁴	20

Vision 2047: Sustainable Developments towards Atma Nirbhar Bharat (VSANB-2022)

EVALUATION OF GRAPE RAISIN VARIETIES UNDER NORTHERN DRY ZONE OF KARNATAKA	21
Shruti C Jugati Dr. Sanganabasav G. Gollagi, Dr Sanganabasav Gollagi	21
GROWTH AND YIELD PERFORMANCE OF VARIOUS WHEAT VARIETIES IN NORTH WEST ALLUVIAL PLAIN ZONE	22
Abhik Patra ¹ , R. P. Singh ¹ , M. S. Kundu ² , S.K. Gangwar ³ , Gagan Kumar ¹ , Pankaj Malkani ¹ , Bhushan Kumar ¹	22
IMPACT OF VARIOUS RICE AND WHEAT PRODUCTION TECHNOLOGIES ON PRODUCTIVITY AND PROFITABILITY UNDER THE CLIMATE RESILIENCE AGRICULTURAL PROGRAMME	23
S.K. Gangwar ^{1*} , R. P. Singh ² , D. K. Tiwari ¹ , Abhik Patra ² , Abhinav Kumar Singh ^{1,2} , M. S. Kundu ³ and Anupama Kumari ³	23
POTATO AND MAIZE INTERCROPPING: A WAY TOWARDS ECO-FRIENDLY PEST MANAGEMENT AND ENHANCING PRODUCTIVITY	24
R. P. Singh ^{1*} , Abhik Patra ¹ , Gagan Kumar ¹ , Pankaj Malkani ¹ , Bhushan Kumar Singh ¹ , S.K. Gangwar ² , D. K. Tiwari ² , Abhinav Kumar Singh ^{1,2} , M. S. Kundu ³ and Anupama Kumari ³	24
YIELD GAP ANALYSIS OF SUMMER MUNGBEAN (<i>VIGNA RADIATA</i>) THROUGH ON FARM DEMONSTRATION OF ZERO TILLAGE TECHNOLOGY IN GAYA, BIHAR	25
Dhiraj K. Singh ¹ , Abhay Kumar ¹ , Ujjwal Kumar ¹ M. Monobrullah ¹ , Rakesh Kumar ¹ , R.K. Raman ¹ , Rajeev Singh ² and Sudip Sarkar ¹	25
MULTI ENVIRONMENTAL EVALUATION AND CHARACTERISATION OF RECOMBINANT INBRED LINES (RILS) IN WHEAT (<i>TRITIMUM AESTIVUM</i> L. EM. THELL) UNDER TERMINAL HEAT STRESS CONDITIONS	26
Meghashri S. Patil* and J. P. Jaiswal	26
IMPACT OF CLIMATE CHANGE ON SOIL, BIO-RESOURCES & BIODIVERSITY.....	27
Swapnil Katyayan, Prashant Yadav.....	27
FRONTLINE DEMONSTRATION OF ECO-FRIENDLY TRAP FOR MANAGEMENT OF FRUIT FLIES IN MANGO	28
Dhiru Kumar Tiwari ¹ , S.K. Gangwar ¹ , R.P. Singh ² , M.S. Kundu ³ , Saurabh Dubey ¹ , Subhashisa Praharaj ¹ , Chelpuri Ramulu ¹ and Ranjan Kumar ⁴	28
CLIMATE RESILIENT TECHNOLOGIES QUINTESSENTIAL FOR REVAMPING SUSTAINABILITY AND ADDRESSING THE SEQUELA OF CLIMATE CHANGE ON CROP PRODUCTION.....	29
Arvind Kumar Singh ¹ , Anshu Gangwar ^{2*} , Ashish Rai ² , Anand Kumar ¹ , Jeer Vinayaka ² , Shirshat Tejashwini Kapil ¹ , Gayatri Kumari Padhi ¹ , Sanskriti Sindhu ² and Suraj Kumar ¹	29
IMPACT OF VARIOUS RICE AND WHEAT PRODUCTION TECHNOLOGIES ON PRODUCTIVITY AND PROFITABILITY UNDER THE CLIMATE RESILIENCE AGRICULTURAL PROGRAMME	30
S.K. Gangwar ¹ , R. P. Singh ² , R. K. Jha ³ , D. K. Tiwari ¹ , Abhik Patra ² , Gagan Kumar ² , Pankaj Malkani ² , B. K. Singh ² , Abhinav Kumar Singh ^{1,2} , M. S. Kundu ⁴ and Anupama Kumari ⁴	30
INDIRECT IMPACT OF LOCKDOWN (DUE TO COVID-19) ON CLIMATE CHANGE.....	31
Deepasha Sahu ¹ , Ritesh Meel ² , Urmila Mehra ³ , Raaz K. Maheshwari ⁴	31
INTERACTIONS WITH SCIENCE, AGRICULTURE AND MANAGEMENT WITH CLIMATE CHANGE.....	32
Sabih Ashraf ^{1*} , Iram Iqbal ² , Aisha Nabi ² , Shaheen K. Jan ³ , T. A. Sheikh ² , F. Jeelani ² and I. A. Lone ² ..	32
VARIETAL PERFORMANCE OF CAPSICUM FRUTESCENCE (SHIMLA MIRCH) IN POLYHOUSE CULTIVATION DURING CLIMATE CHANGE SCENARIO	32
S.K.Rai ¹ , Shilesh Kumar ² , Arun Kumar ³ , Apoorva ⁴	32
EFFECT OF FEEDING A RUMEN MODIFIER ON NUTRIENT UTILIZATION, GROWTH PERFORMANCE AND METHANE PRODUCTION IN CROSSBRED HEIFERS	34

Vision 2047: Sustainable Developments towards Atma Nirbhar Bharat (VSANB-2022)

Deokar D.K., Dahiwale P. A., Kamble D.K. and Sakhare P.S.	34
FISH DIVERSITY OF GODAVARI RIVER AT PRAVARASANGAM DISTRICT, MAHARASHTRA, INDIA	35
Rajendra R. Dandawate	35
EVALUATION OF N AND S NUTRITION ON GROWTH, YIELD AND YIELD ATTRIBUTES OF SAFFLOWER CROP.	35
Umesh Patel ¹ , Dr.S. Thapak ¹ , Dr Anurag ² and Dr V.N.Khune ³	35
USE OF NUTRACEUTICAL AS A NOVEL APPROACH TO COMBAT VIRAL DISEASE CAUSING PATHOGEN (<i>BMNPV</i>) OF SILKWORM, <i>BOMBYX MORI</i> , L.	36
Ganie, A. H., Dar, K. A., Ganie, N. A., and Rafiqi, A. R.	36
PERFORMANCE OF MULBERRY GENOTYPES DURING CHAWKI REARING OF SILKWORM, <i>BOMBYX MORI</i> L. (<i>LEPIDOPTERA: BOMBYCIDAE</i>).....	36
Rafiqi, A. R., Khan, I. L., Ganie, N. A. and Ganie, A. H.	36
COMPARISON OF HERITABILITY ESTIMATES OF FIRST LACTATION TRAITS BY DIFFERENT METHODS IN HF X GIR HALF BREED COWS	37
S. S. Jadhav ¹ , D. K. Deokar ² and S. S. Kamble ³	37
A NEW SPECIES AND FIRST HOST RECORD OF CAMALLANUS, RAILLIET AND HENRY, 1915, IN ALIMENTARY CANAL OF FRESH WATER FISH SCHIZOTHORAX RICHARDSONI FROM POONCH RIVER OF J&K, UT OF INDIA	37
Aurangzeb Anjum.....	37
OIL USED IN TREATMENT AGAINST FOUR SELECTED LIGNOLYTIC FUNGI INVADINGWOOD	38
Virendra Tiwari ¹ , Rashmi Singh ¹ , and A.K. Pandey ²	38
SERICULTURE'S ROLE IN BIODIVERSITY PRESERVATION	39
Kalpna Sudan.....	39
EFFECT OF SUPPLEMENTATION OF MINERAL MIXTURE ON THE GROWTH RATE OF PIGS	39
Suresh Kumar* and Piverjeet Kaur Dhillon	39
STUDY ON BEHAVIORAL ASPECTS OF RHESUS MACAQUES IN JASROTA, KATHUA.....	40
Jyoti Sharma and Khushboo Sharma	40
COPPER INDUCED OXIDATIVE STRESS AND ANTIOXIDANT DEFENSE SYSTEM OF SWISS ALBINO MICE	40
Shikha Shukla ¹ & Pankaj Singh ²	40
ENGINEERING AGRICULTURE VIA CRISPER-BASED GENOME EDITING	41
Sheza Farooq ¹ ^{Error! Bookmark not defined.} and M.F. Baqual ²	41
TUBERCULOSIS, CHALLENGES AND STATUS WITH SPECIAL REFERENCE TO JAMMU AND KASHMIR: A WAY FORWARD.....	41
Ajaz Ahmed Wani	41
TOXICOLOGICAL MANIFESTATIONS OF FUNGICIDE, MANCOZEB AND ITS IMPACT ON FISH PRODUCTIVITY	41
Adeel Ahmad Khan, Manoj Kumar, and Sunil P. Trivedi	41
AN OVERVIEW OF BENZO[A]PYRENE INDUCED GENOTOXICITY IN FISH.....	42
Shikha Dwivedi ¹ and Sunil P. Trivedi*	42
MERCURIC CHLORIDE INDUCES HEPATO-TOXICITY IN FISHES	42
Shefalee Singh and Manoj Kumar*	42
PARAQUAT DICHLORIDE INSTIGATED REPRODUCTIVE STRESS IN FISH.....	43

Vision 2047: Sustainable Developments towards Atma Nirbhar Bharat (VSANB-2022)

Anamika Jain and Manoj Kumar*	43
LARVICIDAL POTENTIAL OF <i>CITRULLUS COLOCYNTHIS</i> SEED OIL LOADED GUM ACACIA NANOPARTICLES AGAINST MALARIA VECTOR, <i>ANOPHELES CULICIFACIES</i>	44
Neha Loach, Shivani Sharma, S.P. Singh ² , C.N. Srivastava, Lalit Mohan ¹	44
WIDE VARIABILITY IN SEX CHROMOSOMES OF SOME OPHIDIANS FROM UT OF JAMMU AND KASHMIR	44
Gurpreet Kour ¹ and Jyoti Sharma ²	44
INSECTICIDAL ATTRIBUTE OF PLANT DERIVED ESSENTIAL OILS AGAINST <i>SITOPHILUS ORYZAE</i> AND <i>TRIBOLIUM CASTANEUM</i>	45
Shivani Sharma, Karan Kumar, Neha Loach, Lalit Mohan*	45
POST-INFESTATIONAL CHANGES IN DIFFERENT MULBERRY (<i>MORUS SPP.</i>) GENOTYPES IN RESPONSE TO <i>GLYPHODES PYLOALIS</i> WALKER	45
Ayoub, O. B., Ganie, N. A., Dar, K. A. and Rafiqui, A. R.	45
SERICULTURE-A VIABLE OPTION FOR SUSTAINABLE LIVELIHOOD AND EMPLOYMENT GENERATION FOR TRIBAL FARMERS OF GUREZ.	46
K.A.Dar, N.A.Ganie, R.K Sharma, F.I.Qadri, I.L.Khan, Masrat Bashir and M.F. Baqual	46
EFFECT OF FEEDING DEWORMER AND MINERAL MIXTURE ON PERFORMANCE OF CROSSBRED DAIRY CATTLE	46
Ranjan Kumar*, R.K. Tiwari, S.K Gangwar, Sanjay Kumar D.K. Tiwari and A. Kundu	46
POTENTIAL MEDICINAL PLANTS FOR ANTICANCER ACTIVITY	47
Gulshba and Manish Kumar	47
CONSTRAINTS PERCEIVED BY THE DAIRY FARMERS IN ADOPTION OF SCIENTIFIC HEALTH CARE PRACTICES IN WEST CHAMPARAN DISTRICT OF BIHAR	47
Singh B K ¹ , Kundu M S ² , Singh R P ¹ , Gangwar S K ³ , Patra A ¹ , Kumar G ¹ and Malkani P ¹	47
IMPACT OF INTEGRATED FARMING SYSTEM ON ECONOMICS OF SMALL AND MARGINAL FARMERS IN ROHTAK DISTRICT	48
Meena Sewhag, D.S. Ahlawat, Neeraj Pawar and Jogender*	48
AN EFFICIENT SYNTHESIS OF BENZIMIDAZOLE DERIVATIVES USING OXALIC ACID DIHYDRATE AND PROLINE BASED LOW TRANSITION TEMPERATURE MIXTURE	48
Vishram Karande ¹ , Priyanka Mohire ¹ , Prasad Patil ¹ , Ajinkya Patravale ^{2,3} , Tanaji Bhosale ² , Dattatray Chandam ^{2,4} , Digambar Kumbhar ¹ , Madhukar Deshmukh ^{1,2*}	48
BIORESOURCE DERIVED POLYMER COMPOSITES FOR ENERGY STORAGE APPLICATIONS: AN APPROACH TOWARDS SUSTAINABLE DEVELOPMENT	49
Priynka Sharma* and Savidh Khan	49
AN EFFICIENT SYNTHESIS OF BENZIMIDAZOLE DERIVATIVES USING OXALIC ACID DIHYDRATE AND PROLINE BASED LOW TRANSITION TEMPERATURE MIXTURE	49
Vishram Karande ¹ , Priyanka Mohire ¹ , Prasad Patil ¹ , Ajinkya Patravale ^{2,3} , Tanaji Bhosale ² , Dattatray Chandam ^{2,4} , Digambar Kumbhar ¹ , Madhukar Deshmukh ^{1,2*}	49
IMPACT OF EROSION CONTROL MODULES ON PHYSICAL ATTRIBUTES OF CLAY LOAM SOIL IN LOWER SHIVALIKS OF DISTRICT KATHUA OF JAMMU	50
Vivak M. Arya, Meena Yadav, Vikas Sharma, Rajeev Bharat, M. Iqbal Jeelani Bhat	50
SYNTHESIS, CHARACTERIZATION AND COMPUTATIONAL STUDY OF QUINOLINE AND THIAZOLIDINE DERIVATIVES	50
Ankit Patel, Harshad Brahmhat and Sangita Sharma*	50
SYNTHESIS, CHARACTERIZATION AND SOME APPLICATIONS OF AND TRANSITION METAL- SALBUTAMOL COMPLEXES	51
Vishlesh Patel, Sangita Sharma*	51

CONTRIBUTION OF CHEMISTRY IN SUSTAINABLE AGRICULTURE	51
Dr. Akanksha Srivastava	51
ADVANCEMENT IN RETAILING, SUPPLY CHAIN INTEGRATIONS, DIGITAL REFORMS & DATA SCIENCES	52
Divya Bhatia.....	52
SOLUTION STATE STUDIES ON SOME BINARY METAL COMPLEXES OF SALBUTAMOL	53
Ashok Chaudhari Sangita Sharma*	53
FUTURE FOOD FOR GROWING POPULATION IN DIET AND HEALTH PERSPECTIVE.....	53
Priyanka Tolambiya.....	53
PERFORMANCES EVALUATION OF SUGARCANE GENOTYPES FOR YIELD & YIELD ATTRIBUTING CHARACTERS	54
Nirmodh Prabha ^{1*} , Ravinder Kr. Sharma ² and Ruchi Sharma ³	54
FAMILY RESOURCE MANAGEMENT: EFFICIENT UTILIZATION OF RESOURCES FOR ATTAINING THE FAMILY GOALS	55
Twinkle* and Manju Mehta	55
DISTRIBUTION OF MICRONUTRIENT CATIONS (ZN, CU, FE AND MN) AMONG DIFFERENT LAND USE SYSTEMS UNDER DISTINCT SOIL ORDERS IN MALWA REGION OF PUNJAB IN NORTH-WESTERN INDIA	56
Gowthamchand N J ^{1*} , Salwinder Singh Dhaliwal ¹ , Vivek Sharma ¹ , Manpreet Kaur ² and Gitanjali Rathore ¹	56
MUSHROOM PRODUCTION IN THE WORLD: AN OVERVIEW	57
Durga Prasad ^{1*} and R. P. Singh ²	57
ROLE OF MUSHROOM TECHNOLOGY IN SOCIOECONOMIC UPLIFTMENT OF SOCIETY.....	58
R. P. Singh ^{1*} and Durga Prasad ²	58
MUSHROOM PRODUCTION IN INDIA: CURRENT STATUS AND FUTURE NEEDS	59
Durga Prasad ^{1*} R. P. Singh ²	59
MUSHROOM ENTERPRISE: A GOOD OPTION FOR AGRI-ENTREPRENEURSHIP	60
R. P. Singh ^{1*} , Durga Prasad ²	60
VISION 2047: INDIA – THE ROADMAP TO BECOMING A DEVELOPED COUNTRY	61
Pradhnyal Kulkarni, Shounak Joshi, Shubham Chavan.....	61
EFFECT OF GLOBAL WARMING ON OUR FAUNA	62
Amber Khan	62
EFFECT OF GLOBAL WARMING ON OUR HEALTH	63
Sapna	63
STUDY ON THE KNOWLEDGE OF VARIOUS SERICULTURE TECHNOLOGIES AT FARMER'S LEVEL IN TEHSIL PATTAN OF DISTRICT BARAMULLA	63
R K Sharma, M R Mir, I L Khan, M. Bashir, M F Baqual and Ishtiyah Ahmad Bhat	63
ARSENIC TOXICITY, ABSORPTION BY PLANTS AND PHYTOREMEDIATION TECHNOLOGY: AN OVERVIEW	64
Princee and Manish Kumar	64
DEFLUORIDATION OF GROUNDWATER EMPLOYING NAGFANI [<i>OPUNTIA DILLENII</i>].....	64
BL Choudhary ¹ , Ritesh Meel ² , Deepaasha Sahu ³ , Raaz K Maheshwari*	64
DEFLUORIDATION GROUNDWATER EMPLOYING NANOTECHNOLOGICAL APPROACH.....	65
Krishan Pal ¹ , Piyush Panwar ² , Anil Kumar ³ , Deepasha Sahu Raaz K. Maheshwari ⁵	65

Vision 2047: Sustainable Developments towards Atma Nirbhar Bharat (VSANB-2022)

DETRIMENTAL INDOOR AIR POLLUTION: ITS SOURCES, INFLUENCE ON HEALTH AND EXTENUATION PROGRESSIONS.....	66
Anil Kumar ¹ , Deepasha Sahu ² , Ritesh Meel ³ , Raaz K. Maheshwari ⁴	66
Dr. Priti Mathur	66
DESIGN OPTIMIZATION OF 3D PRINTED FASHION ACCESSORIES USING FUSED DEPOSITION MODELING.....	67
Nitesh Krishnan J, Aakash Dewangan.....	67
TEXTILE CRAFTS OF HIMANCHAL PRADESH: A RELIABLE MEANS OF SUSTAINABLE DEVELOPMENT	67
Babita Bhandari,	67
THE MULTI FUNCTIONAL AND LOW-COST FOOTWEAR FOR MILLENNIAL WOMEN: FORESIGHTS FOR FASHION AND TECHNOLOGY.....	68
Varun Gupta ¹ , Virat Dubey ² , Yashahsvi Gupta ² , Aashi Jain ² ,.....	68
THE PERSPECTIVES OF INDIAN EDUCATION SYSTEM: A CASE STUDY- OF PRIMARY EDUCATION SYSTEM IN AHMEDNAGAR DISTRICT, MS	68
Dr. Misal Nivrutti Vinayak.....	68
PHYSICAL PROPERTIES OF CORE SPUN YARNS OF FLAX, LYOCELL AND SPANDEX FIBERS	69
Swati Sahu* and Alka Goel.....	69
INNOVATIVE PRODUCT DESIGN FOR LIP-GLOSS	69
Muskan Narang, Manoj Kumar Paras.....	69
SOCIO-ECONOMIC TRANSFORMATION THROUGH CUSTOM HIRING CENTRES AMONG FARMING COMMUNITY OF HARYANA – A SOCIOLOGICAL APPRAISAL	70
Subhash Chander and Vinod Kumari,	70
CREATING AWARENESS OF TEXTILE RECYCLING.....	70
Shweta Dhiman*, Dr. Babita Bhandari, Manoj Kumar Paras	70
APPLICATION OF NATURAL DYES AND RESIST MATERIAL IN BATIK	71
Dr. Krishi Sarin ¹ , Rajesh Kumar Sharma ² , Pradeep John Kerketta ³	71
DESIGN OPTIMIZATION IN THE OPENING OF HIP FLASK	71
Epshita Sehgal, Nitesh Krishnan J, Aakash Dewangan	71
DESIGN OPTIMIZATION OF METAL PIN IN WRIST WATCH	72
Ananya, Nitesh Krishnan J, Aakash Dewangan	72
A STUDY OF SIGNIFICANT FACTORS DETERMINING STUDENTS' SATISFACTION IN PROFESSIONAL PROGRAMS WITH SPECIAL REFERENCE TO BUSINESS MANAGEMENT IN HARYANA	72
Dr. Parveen Maan ¹ , Dr. Avinash Bajpai ²	72
DESIGNING OF NATURAL FIBER-BASED UPCYCLED FOOTWEAR	73
Pradeep Kumar Shukla ^{1*} , Arun Gaikwad ²	73
AN AUTOMATIC SYSTEM TO SIMPLIFY PATTERN MAKING FOR GARMENTS.	73
Sarini Singh, Aakash Dewangan and Manoj Kumar Paras*	73
CRADLE TO CRADLE: DEVELOPING AND INCORPORATING OF WHOLE SYSTEM THINKING FOR SUSTAINABLE DEVELOPMENT (TEXTILES & FOOTWEAR).....	74
Rajesh Sharma ¹ , Krishi Sarin ² , Pradeep John Kerketta ³	74
INDIAN BANKING SYSTEM	74
Dr. B. B. Chopade	74

OPTIMIZING REVOLUTION DEVELOPMENT OF SUSTAINABLE GLIDE SHOE IN BIODEGRADABILITY STUDY IN COMPOST ENVIRONMENT.....	75
T. Loganathan*, Vishva Kumar	75
AN AUTOMATIC SYSTEM TO SIMPLIFY PATTERN MAKING FOR GARMENTS	76
Sarini Singh, Aakash Dewangan and Manoj Kumar Paras*	76
DESIGNING OF FLARED <i>KHADI KURTIES</i> USING CAD WITH DIFFERENT CONSTRUCTIONAL FEATURES	76
Gayatri ¹ *, Alka Goel ² and Sakshi ³	76
CORRELATION OF AWARENESS AND PRACTICES OF SCHOOL GOING GIRLS TOWARDS SELF-DEFENSE	77
Pragnya Priyadarshini Panda ¹ and Dr. Gaytri Tiwari ²	77
RECYCLING OF INDUSTRIAL WASTE INTO USEFUL MATERIAL	77
Vanni Sharma*, Manoj Kumar Paras	77
COMPUTER AIDED DESIGNING OF HAND-WOVEN MANIPURI <i>PHANEK</i> WITH <i>PHULKARI</i> EMBROIDERY FOR SUSTAINABILITY OF THE CRAFTS	78
Saikhom Debina Chanu and Sumeet Grewal.....	78
MITHILA PAINTING PARTICIPANTS FROM RURAL AREAS GET SOCIAL EMPOWERMENT	79
Savita Kumari ¹ *, Satya Prakesh ² and Sradha Kumari ³	79
A STUDY OF ANALYSING RELATION BETWEEN STORE LOYALTY PROGRAMS AND CUSTOMER LOYALTY CREATED THROUGH STRUCTURAL EQUATION MODELING WITH SPECIAL REFERENCE TO AMAZON ONLINE STORE	80
Dr. Avinash Bajpai ¹ , Mr. Arun Kumar Gaikwad ²	80
<i>FALCONERIA INSIGNIS</i> : A NOVEL PLANT SOURCE FOR SUSTAINABLE FINISH ON MUSEUM TEXTILE ANTIQUITIES.....	81
Dr. Pooja Singh ¹ * and Dr. Alka Goel ²	81
PROJECT STUDY ON EMPLOYMENT GENERATION THROUGH MAKE IN INDIA IN FOOTWEAR AND ALLIED MANUFACTURING SECTOR.....	82
Rajesh Parashar ¹ , Neeraj Sharma ²	82
“TO ANALYSE BARRIERS TO THE ADOPTION OF ONLINE SHOPPING FOR LOW INVOLVEMENT PRODUCTS BY INDIAN CONSUMERS.”	82
Gaurav Singh	82
EXPLORATION OF ALTERNATIVE LEATHER FOR THE FASHION INDUSTRY- A CASE STUDY	83
Anoop Singh Rana.....	83
MASSTIGE APPAREL BRANDS: CRITICAL REVIEW & PROPOSITIONS.....	84
Kuldeep Ghorapade	84
EVALUATION STUDY ANALYSIS ABOUT NON-LEATHER SHOES- VINYL MATERIAL VS NATURAL MATERIAL SHOES - BANANA FABRIC.....	84
D. Ramesh ¹ , T. Rama Sastri ²	84
ENGINEERING PROPERTIES OF FOXTAIL MILLET GRAINS.....	85
Sanganamoni Shivashankar ¹ *, N C Shahi ¹ , U C Lohani ¹ , Anil Kumar ¹ and V K Singh ¹	85

INVITED TALK

RECENT ADVANCES IN BIODIVERSITY AND CONSERVATION STATUS OF INDIAN FISHES

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The Convention on Biological Diversity (CBD) which came into force in 1993 after United Nations Conference on Environment and Development (UNCED), Rio de Janeiro (June 03-14, 1992) reaffirms the sovereign rights of the member nations over their entire genetic resources. It also envisages conservation, sustainable use and equitable sharing of the benefits arising from the biological resources. Rio+20, the United Nations Conference on Sustainable Development (UNCSD-2012), held during June 20-22, 2012 at Rio de Janeiro was attended by 192 UN Member states with the three objectives (i) securing renewed political commitment for sustainable development, (ii) assessing the progress and implementation gaps in meeting previous commitments and (iii) addressing new and emerging challenges. Our natural resources, including fishes are the backbone of sustainable development. There are more than 33,100 finfish species throughout the world which is more than the combined total of all the other vertebrate species (amphibians, reptiles, birds and mammals).

India has been identified as one of the mega biodiversity centres for the genetic resources in the world and the same is true in case of fishes too. Nearly 2,936 species of finfishes belonging to 44 Order, 252 Family and 1,069 Genus have been recorded from different ecosystems of the country. The approximate ecosystem-wise distribution of fish germplasm resources of this subcontinent are- freshwater (936; 31.78%), brackishwater (113; 3.85%) and marine (1887; 64.37%). Out of these, about 258 species are commercially important which include cultured, cultivable and wild taxa, 199 endemic and 275 game fishes. There is record of the introduction of 462 exotic species in Indian water, most of which are of ornamental value. Due to various anthropogenic stresses, a number of fishes are showing declining trends in their catches from the conventional fishing grounds and some have become threatened too. Though the decline of individual fish species is very often related to more than one proximate factors, the various causes of imperilment of fishes in the different ecosystems have been identified as- (i) physical habitat loss due to construction of dams and weirs across the rivers, soil erosion due to deforestation and excessive utilization of waters, (ii) chemical pollution due to industrial and municipal wastes, (iii) over-exploitation and indiscriminate killing of juveniles and brood fishes, (iv) competition from the introduced non-indigenous species and (v) spread of dreaded diseases. Maintenance and preservation of fish biodiversity along with other biotic resources is being viewed as prerequisite even for human well-beings.

The status assessment conducted by the American Fisheries Society (AFS), Bethesda revealed that about 33% of the native freshwater fish taxa in North America are either endangered, threatened, or of special concern with membership of each group exhibiting significant increase during the last two decades. At least 106 Pacific coast stocks of anadromous salmon and trout are extinct and 212 more are at the risk of extinction or of special concerns. Similarly, out of nearly 793 freshwater species distributed throughout the heavily industrialized Europe, about 101 species were declared threatened during 1987. Of the 662 native freshwater and diadromous fishes assessed recently in the Southern United States, 7 have been categorized as Extinct, 41 (6%) Endangered, 46 (7%) Threatened and 101 (15%) Vulnerable. Further, there exist reports that around 36% of the crayfishes and 55% of mussels in North America are either extinct or imperiled. As per Red Data Book of IUCN (2008), 16,928 taxa of life forms are threatened globally which includes 1,275 species of fishes. In Asia, 6,106 organisms are threatened of which 688 are finfish. IUCN recorded 659 (3% of world-wide) animal species of India are threatened of which 42 species are fishes. India possess maximum number (27.8%) of endemic freshwater fish species among Asian countries followed by China, Indonesia and Myanmar.

Though the formidable task to categorize threatened fishes of India on the line of IUCN list is still to be completed but efforts have been made during the past in this direction. Menon (1989) compiled a list of 21 vulnerable fishes in India which comprised 4 Endangered (*Barilius bola*, *Puntius chinoides*, *Semoplotus semiphotus* and *Enobarbichthys maculatus*) and 17 Threatened species (*Notopterus chitala*, *Acrossocheilus hexagonolepis*, *Cirrhinus cirrhosa*, *Labeo fimbriatus*, *Labeo potail*, *Labeo kontius*, *Puntius carnaticus*, *Puntius curmuca*, *Puntius jerdon*, *Tor khudree*, *Tor putitora*, *Tor tor*, *Schizothorax richardsonii*, *Schizothoraichthys progestus*, *Silonia childreni*, *Pangasius pangasius* and *Bagarius bagarius*). Interestingly, out of 762 fishes featured in the IUCN Red Data Book of Threatened Animals (1990) throughout the world, only 2 species- *Schistira sijuensis* (Family Bolitoridae) and *Horaglanis krishnai* (Family Clariidae) were included from the Indian waters as Rare species. During 1993, the NBFGR, Lucknow had tentatively identified 4 Endangered, 21 Vulnerable, 2 Rare and 52 Indeterminate fishes from the different ecosystems of the Indian waters. Molur and Walker (1998) released a long list (227 out of 329 species evaluated) of the threatened freshwater species but conservation status of these fishes requires further verification through the actual field surveys.

The most endangered cobitoid loach, *Enobarbichthys maculatus*, is known by a single specimen kept in the British Museum. It is felt that this species might have become Extinct as no specimen has so far been found ever since it first described by Day in 1867. *Gymnocypris biswasi* has been reported as Extinct from Ladhak region of this country. Similarly, the Gangetic shark, *Glyphis gangeticus*, has been reported as “probably Extinct” because only three museum specimens are currently known in the collections- one each in the Museum National d’ Histoire Naturelle, Paris, Humboldt Museum, Berlin and Zoological Survey of India, Calcutta. All these specimens were collected during 19th century with no confirmed record after 1867. Threatened fishes of Malabar region (Western Ghats) of the Peninsular India, include 8 Endangered (*Barilius canarensis*, *Hypselobarbus jerdoni*, *H. kurali*, *H. lithopidos*, *H. periarensis*, *H. pulchelus*, *H. thomsi* and *Etroplus cararensis*), 2 Vulnerable (*Labeo dussumieri* and *Pseudobagrus cryseus*) and 8 Rare species (*Osteobrama bakeri*, *Echanthalakenda ophiocephalus*, *Puntius chalakudensis*, *Lepidopygopsis typus*, *Batasio travancoria*, *Horaglanis krishnai*, *Monopterus fossorius* and *Pristolepis fasciatus*). Out of 27 species recorded from the Periyar Lake-stream system of southern-western Ghats (Kerala), 14 (52%) are reported to be threatened. Menon (2004) listed 74 species as Threatened from the Indian waters while Lakra *et al.* (2010) extended the list to 120 taxa. Among 52 species of catfishes recorded in Nepal, 22 are reported as Rare from Gandaki, Kosi, Karnali and Mahakali rivers. The whale shark (*Rhiniodon typus*) occurring in the north-west coastal waters of India has become critically endangered due to directed fishing off Saurashtra (Gujarat) coast since 1980s and needs immediate protection. However, it is pertinent to remark that several species of snappers and groupers (Lutjanidae, Serranidae), rockfishes (Sebastinae) and some sharks (Selachi), rays (Rajidae) and sawfishes (Pristidae) have also become Vulnerable/ Endangered in the American waters due to excessive fishing as these fishes have slow growth rate, late maturity and low fecundity.

It is essential to prevent the further decline of fish germplasm resources by devising all the possible *in situ* as well as *ex situ* measures of conservation and rehabilitation. The conservation policy should promote the management practices that maintain integrity of aquatic ecosystems, prevent endangerment and enhance recovery of the threatened species. Five principal elements or tasks in the recovery programs have been suggested which include - (i) habitat management, (ii) habitat development and maintenance, (iii) native fish stocking, (iv) non-native fish invasion and sport-fishing and (v) research data management and monitoring. The Government of India has various Acts, Rules and Regulations for helping society to conserve fish and aquatic biodiversity with judicious utilization for betterment of human beings. Consequent to CBD (1992), the Government of India has enacted Biological Diversity Act, 2002 (BDA-2002), Biological Diversity Rules, 2004 (BDR-2004) and National Biodiversity Action Plan (NBAP, 2008) to put administrative procedures with a view that the inherent biological resources are optimally utilized along with protecting sovereign right of the nation over them. The irreparable harm caused to fish and habitats need be compensated through forestation, eco-restoration, soil conservation, complete ban on deforestation, particularly in the fragile mountains and strict implementation of Endangered Species Act (ESA)/Indian Fisheries Act (1887, modified in 1956). Declaration of "State Fish", closing season for mahseer in Himachal Pradesh and conservation

aquaculture of *Tor putitora*, *Lates calcarifer*, *Mugil cephalus*, *Etroplus suratensis*, *Chitala chitala* are the positive steps in this direction. Balakrishnan Nair Committee Report (2001) reported the ban of fishing in Kerala (i) has led to an increase in fish landing, (ii) revived the stock position leading to improvement in catch per unit effort (CPUE) and (iii) real improvement in size group of exploited commercial fisheries. Furthermore, in a huge country like India with diverse ecosystems, enforcement of law is not an easy task. The most effective way of tackling the problem seem to be the mass consciousness (awareness) drive through active participation of the public.

END POINT BIO MARKERS FOR MONITORING HEAVY METAL POLLUTION IN FISHES

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ABSTRACT

Water pollution is a crucial problem in all parts of the world. Rivers are degrading, especially due to heavy metal pollution from anthropogenic activities. Heavy metals are toxic and carcinogenic and become dangerous when they pollute water because they accumulate in water bodies and biota. Biomarkers have become a valuable tool in environmental assessment because they contribute to the prediction of pollutants in monitoring programs. Present work briefly describes the toxicity of heavy metal exposure to fish using a multi-biomarker approach (bioaccumulation, oxidative stress, genotoxicity) in fish. The use of molecular biomarkers has become increasingly popular in recent years and continues to have a promising future. Therefore, the present study aims to monitor aquatic pollution using biomarker approaches in many aquatic organisms. This study will help to identify and encourage biomarker research in the future, particularly for monitoring heavy metal pollution in rivers.

KEYWORDS: Heavy metal; pollution; Biomarkers; Bioaccumulation; Oxidative stress; Genotoxicity

Session – I

VALUE ADDITION IN TRADITIONAL CROPS

PERFORMANCES EVALUATION OF SUGARCANE GENOTYPES FOR YIELD & YIELD ATTRIBUTING CHARACTERS

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ABSTRACT

Evaluation of various sugarcane genotypes for yield & yield attributing traits was conducted at the experimental area of Sant Kabir College of Agriculture & Research Station, Kawardha (Kabirdham) Chhattisgarh. Twelve early genotypes along with 4 standard checks and twenty four mid late group genotypes along with 4 standard checks of sugarcane were tested Checks viz. Co 85004, Co 94008, CoC 671 and CoM 265 and four standards viz. Co86032, Co99004, Co 8014 and Co 8636 respectively. These genotypes of sugarcane were evaluated in the completely Randomized block design with three replications for their yield performance and other yield & quality attributing traits. The genotypes of sugarcane were collected from Central Sugarcane Research Station (MPKV), Padegaon (Maharashtra). In early group MS 13081 (116.47 t/ha), was found significantly superior over the best standard COM 265 (103.39 q/ha). However, the genotype MS 13081 exhibited better performance for cane yield also showed satisfactory performance for brix% (20.43) and sucrose % (10.96) while in mid late group of sugarcane genotypes CO 13013 (153.04 t/ha) followed by genotype CO 13009 (150.13 t/ha), CoN 13074 (147.16 t/ha) and CoM 13074 (146.25 t/ha) were found significantly superior over the best standard Co-99004 (113.10 t/ha). Genotypes MS 13081 early group and CO 13013 mid late group exhibited good performance in terms of average cane yield and yield components as compared to the standard checks. Stem height, single cane weight, length of nodes, brix percentage and sucrose percentage were play pivotal role for cane yield.

KEYWORDS: Evaluation, sugarcane, yield traits, quality traits.

ANTIMICROBIAL ACTIVITIES OF MEDICINAL PLANTS

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ABSTRACT

Role of medicinal plants is significant in the treatment of infectious diseases especially against viral infection. these plants possess lots of therapeutic agent which show anti-microbial properties. With the passage of time scientific & pharmaceutical communities researched on number of plants to understand their mechanism. By using synthetic & commercial antibiotics causes hazardous effects on the human health. So now a days people have awareness how to overcome these factors. Now they prefer to use plants derivative medicine for the treatment of all viral infections. List of plants are present, but some are important as a microbial agent. In these important are *albizia lebbeck*, *acacia concinna*, *bunium persicum*, *vitex negundo*, *solanum albicaule*, *boehavia diffusa*, *arnebia nobilis* and *garcinia indica*.

KEYWORDS: Anti-microbial activities, therapeutic agent, medicinal plants, plants extract

COMPARATIVE ANALYSIS OF COST, RETURNS AND LABOUR HOURS IMPACT ON PRODUCTION OF COTTON & SUGARCANE CROPS IN HARYANA WITH HIGHEST PRODUCING STATE IN INDIA

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ABSTRACT

The CAGR of Bullock labour is decreasing in Haryana then its competitive producing states. As we compare cotton and sugarcane crops with highest producing states and found that most of the inputs like machine labour, irrigation, insecticides were higher in Haryana. The CAGR found in Cotton crop in Haryana for Human Labour, Machine Labour, Seed, Fertilizers & manures, Insecticides and Irrigation Charges was 9.77, 11.69, 17.81, 11.05, 2.64 and 10.65 percent respectively and for the same crop in Punjab was 9.97, 6.07, 15.71, 10.97, 1.44 and 2.10 respectively. For Sugarcane crop it was found 9.53 & 9.87, 9.36 & 5.13, 12.10 & 1.99, 9.35 & 5.14, 7.58 & 8.84 and 3.60 & 4.73 percent respectively in Haryana and Tamilnadu. The CAGR in total cost of Cotton, Cost of production, Value of main product and value of by-product for Haryana & Punjab was found 9.61 & 8.72, 6.46 & 4.62, 9.55 & 10.32 and 12.34 & 12.76 percent respectively. Similarly, the CAGR in the above-mentioned components for Haryana and Tamilnadu was found 8.35 & 7.28, 7.68 & 8.20, 8.87 & 8.53 and 11.46 & 7.38 percent respectively. The cost analysis shows that the CAGR in total cost of Cotton, and Sugarcane crop was higher in Haryana. The production of cotton and sugarcane crops compare with highest producing state shows that human labour observed significant behaviour in cotton and sugarcane. Similarly in animal labour found negative significant in cotton and non-significant in sugarcane. The major yield gaps are due to lack of proper management practices.

KEYWORDS: CAGR, sugarcane crops, machine labour, irrigation, insecticides

THE PERSPECTIVES OF INDIAN EDUCATION SYSTEM: A CASE STUDY- OF PRIMARY EDUCATION SYSTEM IN AHMEDNAGAR DISTRICT, MS

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ABSTRACT

The present works deals with study of From ancient times, people think that knowledge is sacred. Lord Macaulay's theory is now outdated. Modern education system really needs radical changes in it. Mahatma Fule's views still proves right. It was his demand that primary education should be free and compulsory The district Ahmednagar is important district in Maharashtra, India.It comprises 14 tehsils .Each tehsil with Primary, Secondary and higher education system.. The teachers should be encouraged to work in hilly and tribal areas. The primary education should be strengthened by providing basic life education in the primary schools. Primary classrooms should be well equipped. So that the attitude of upper classes about primary schools will be changed. The government should see that all these things are done effectively and nobody would be deprived of primary education. This is in the interest of society as well as of nation's development.

KEYWORDS: Primary, Remedies , Percolation, Education, Knowledge

EFFECTS OF PRE-SOWING SEED TREATMENTS WITH AM FUNGI ON THE ACCUMULATION OF SEED PROTEINS IN SOYBEAN UNDER CADMIUM STRESS

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ABSTRACT

Various abiotic stresses imposed naturally or by anthropogenic activities negatively impact global agricultural output. Compared to cereals, legumes are more prone to environmental stress. The present study aimed to understand better cadmium's effects on numerous seed protein characteristics in soybean. Considering the legumes' tolerance to Cd and its permissible limit in the soil, Cd (as CdCl₂.H₂O) at concentrations of 10, 20, and 30 mg per kg of soil was supplied to plants. In soils with different levels of Cd, the effects of the arbuscular mycorrhizal fungi (AMF), *Glomus mosseae* and *G.fasciculatum* (added as VAM powder, 25g/1kg of seeds) on growth, total seed protein content, the proportion of seed protein fractions, and the relative intensity of polypeptides on SDS gels were studied. At maturity, seeds were collected and stored in a deep freezer till further analysis. It was found that the total amount of seed protein content in control decreased gradually from 41.5% to 38.5% when the concentration of Cd was increased from level 1 (10 mg) to level 3 (30 mg). However, the effect of Cd was reduced in plants that were treated with AM fungi, which resulted in considerable improvements in the total seed protein content. Compared to *G. mosseae*, *G. fasciculatum* is more effective in boosting plant growth and the amount of protein they contain at Cd levels 1 and 2. In contrast, at the third Cd level, both *Glomus* species equally improved the plants' growth characteristics. On SDS gels, quantitative changes in polypeptide intensity were also observed. GelAnalyzer was utilised to compute and examine polypeptide bands' Rf values and intensities.

KEYWORDS: Soybean, AM fungi, Cadmium, SDS-gel

FEASIBILITY OF INTERCROPPING IN MULBERRY IN KASHMIR

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ABSTRACT

Mulberry (*Morus spp.*), a fast growing, deciduous, woody perennial angiosperm has an ability to grow as bush, dwarf and tree under varied agro climatic conditions. It produces leaf which is the only food to silkworm (*Bombyx mori* L.) reared to produce silk, the "Queen of textiles". The plant has a great regeneration capacity and produces two flushes of leaf per year as against all other tree species of this region. The plant has a wider adaptability and can be grown under varied agro climatic conditions either under irrigated or rainfed conditions. Despite this, the plantation in the region does not increase the way other tree species do probably because sericulture, the rearing of silkworm for the production of silk, has never been taken as a full-fledged occupation in the whole region even it has been a traditional agro-industry in the union territory. This might be because mulberry as a monoculture does not seem to attract the farmers who feel reluctant to devote their land exclusively to mulberry cultivation as only one crop is taken at farmers level that too for a period of less than a month during May-June. The farmers also unknowingly believe that nothing grows beneath a mulberry plant, thus giving preference to the cultivation of other crops either as sole or mixed cropping.

KEYWORDS: dwarf and tree, *Queen of textiles*, adaptability, monoculture

EFFECT OF IMPROVED CULTIVATION PRACTICES ON PIGEON PEA PRODUCTION AND ECONOMICS IN VINDHYA PLATEAU AGRO-CLIMATIC ZONE OF SAGAR DISTRICT, MADHYA PRADESH

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ABSTRACT

Among the pulses crops, pigeon pea [*Cajanus cajan* (L.) Millsp.] is one of the important crop of India and 91% of the world's pigeon pea is produced in India. The productivity of pigeon pea crop of Madhya Pradesh as well as in Sagar district is quite low as compare to production potential. Among various constraints, poor crop management and protection technologies assume primary position for considering the facts of low yield of pigeon pea. To replace this anomaly, Krishi Vigyan Kendra, Sagar, Madhya Pradesh had conducted 195 cluster frontline demonstration (CFLD) in an area of 80 ha. The short duration pigeon pea variety TJT 501 with improved package and practices were followed on farmers' field during 2016-19. The results of three years under CFLDs on pigeon pea revealed that the average grain yield of pigeon pea 9.21 q/ha under demonstration plots as compare to farmers practice 5.76 q/ha and an average yield advantages registered up to 63.28% higher over the farmers practice. The highest grain yield (9.83 q/ha) was recorded in the year 2018-19, it was 60.36% more over the farmers practice (6.13 q/ha), however the lowest yield (8.27 q/ha) was recorded under FLDs plot and 4.40 q/ha in farmers practice during 2017-18. Average net profitability of worth Rs. 24991 per ha as compared with farmers practices (Rs. 12265 per ha) were obtained and benefit cost ratio *i.e.*, 2.59 and 1.89 were recorded in demonstrated plot and farmers practice respectively. Technology gap in pigeon pea crop under CFLDs was 8.17 to 9.73 q/ha whereas extension gap ranges was 2.80 to 3.87 q/ha and technology index was varied from 47.00 to 54.06%. Variations in the technology gap and index percentage were observed due to variation in agro-climatic parameters, soil fertility, biotic stresses, and socio-economic status and management practices. This variation can be narrowed down by encourage the farmers to adopt economical viable technologies for enhancing the production and productivity of the crops.

KEYWORDS: CFLDs, benefit cost ratio, technology gap

LOW-COST EVAPORATIVE COOLING TECHNIQUE FOR STORAGE OF POTATO, ONION AND GARLIC IN WEST CHAMPARAN, BIHAR, INDIA

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ABSTRACT

Extreme heat events and unseasonal rain cause massive losses of the farm produce of small and marginal farmers in district west champaran, Bihar. Since the market is the primary medium for farmers to exchange their produce for money, but the lack of post-harvest storing facilities in rural areas, its consequences in detractive of the farmers' ability to monetize their farm produce. Thus, a low-cost post-harvest technique is needed on a priority basis because of the perishable nature of farm produce by the small and marginal vegetable growers. Krishi Vigyan Kendra Narkatiaganj and Madhopur technocrats surveyed potato, onion and garlic growers in three villages of Nautan block, West Champaran. KVK scientists trained to the cash crop growers purposely. A low-cost evaporative cooling storage system established by the farmers for cash crops like potato, onion and garlic to extend its shelf life and reduce the magnitude of losses in the circumstances of poor post-harvest logistic facilities. Mud, bamboo, cow dung and straw are being used as a wall material. It is eco-friendly and no energy requires for storage of vegetables. The economic benefit was highest in low-cost evaporative cooling storage system as compared to conventional and even from a commercial storage system. This also improves the quality of vegetables by reducing temperature, prolonging shelf life and reducing post-harvest losses.

KEY WORDS: Post harvest technology, evaporative cooling system, climate change, extreme heat

PERFORMANCE OF EARLY CAULIFLOWER VARIETY SABOUR AGRIM IN WEST CHAMPARAN DISTRICT OF BIHAR

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ABSTRACT

Cauliflower (*Brassica oleracea* var. *botrytis*) belongs to family Brassicaceae and is popular for its white tender, head or curd. Cauliflower is one of the most important winter flower vegetables of India. Attempts were made to improve productivity and to increase area under early cauliflower by adopting high yielding variety in the specific location. In order to compare performance of conventional cauliflower varieties of that locality with improved variety, 10 front line demonstrations (FLD's) were laid out at farmers' field to show the worth of new variety over local check. Likewise, to facilitate the farmers through FLD's about potential of new improved production practices of cauliflower for the adoption, knowledge enhancement and satisfaction were undertaken. The demonstrations resulted in enhancement in productivity. The yield was found to be increased from 314 (q/ha) in local check to 346.5 (q/ha) under FLDs. Similarly, the benefit: cost ratio was improved to 3.17 as compared to 2.75 in local check. Farmers can gain a handsome profit by growing Sabour Agrim adopting the transplantation and agronomic practices.

KEYWORDS: Brassicaceae, high yielding variety, FLD's

ADVANCEMENT IN AGRICULTURE NANOTECHNOLOGY: A ROAD TO FUTURE

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ABSTRACT

In today world the agricultural sector is burden with the continuous growing demands of food to satisfy global hunger, crops with better nutritional quotient and free from chemical fertilize has influenced the future as well as methods of farming. We need to concentrate to develop new tools with various technological advancement with can deal with the enormous challenges of decrease in soil fertility with the excess use of chemical fertilizers and pesticides. In the last two decades nanotechnology finds its applications in multiple fields such as in chemistry, pharmaceutical, and diagnosis. The use of nanomaterials which may include nanoclays, nanotubes, and nanowires in agriculture field can be greatly useful to address different problems such as pest infestation, natural disasters, poor quality of soil. In this regard nano-sized fertilizers, pesticides, fungicides, and sensors, have been extensively scrutinised which leads to reduce nutrient losses to increase yields, reduce the amounts of products for plant protection, and minimize the cost of production to maximize output. For example polymeric nanoparticles are used in the delivery of agrochemicals in a slow and controlled manner, silver nanoparticles are used for their antimicrobial property, carbon nanoparticles are used for improved seed germination, nickel ferrite nanoparticles and copper nanoparticles have a strong antifungal property, zinc oxide nanoparticles, and silica nanoparticles are effective against viral diseases. This work focus on the impact of nanoparticles in agriculture field.

KEYWORDS: nutritional quotient, chemical fertilizer, pest infestation,

LOW-COST EVAPORATIVE COOLING TECHNIQUE FOR STORAGE OF POTATO, ONION AND GARLIC IN WEST CHAMPARAN, BIHAR, INDIA

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ABSTRACT

The northern Bihar region is privileged with different types of vegetables. However, unseasonal rainfall and extreme heat during summer, affecting the shelf life of the vegetable, which goes waste due to absence of appropriate storage during various steps of the post-harvest chain. Potato, Onion and garlic are a widely consumed and valuable cash crop vegetable in the region throughout the year. The opposed weather cause massive losses of the farm produce of small and marginal farmers in district West Champaran, Bihar. Since the market is the primary medium for farmers to exchange their produce for money, but the lack of post-harvest storing facilities in rural areas, its consequences in detractive of the farmers' ability to monetize their farm produce. Thus, a low-cost post-harvest technique is needed on a priority basis because of the perishable nature of farm produce by the small and marginal vegetable growers. Krishi Vigyan Kendra Narkatiaganj and Madhopur technocrats surveyed potato, onion and garlic growers in three villages of Nautan block, West Champaran. KVK scientists trained to the cash crop growers purposely. A low-cost evaporative cooling storage system established by the farmers for cash crops like potato, onion and garlic to extend its shelf life and reduce the magnitude of losses in the circumstances of poor post-harvest logistic facilities. Mud, bamboo, cow dung and straw are being used as a wall material. It is eco-friendly and no energy requires for storage of vegetables. The economic benefit was highest in low-cost evaporative cooling storage system as compared to conventional and even from a commercial storage system. This also improves the quality of vegetables by reducing temperature, prolonging shelf life and reducing post-harvest losses.

KEYWORDS: Post harvest technology, evaporative cooling system, climate change, extreme heat

POSTHARVEST HANDLING, PROCESSING AND PRESERVATION OF FOOD

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ABSTRACT

Postharvest handling is the practice performed by the grower after the harvest of the food which include cooling, grading, sorting, packaging etc. to improve the quality of the food produce. Food processing refers to the transformation of raw food produce to a value added product without loosing its nutritive value which help in boosting the economy of the grower. Processing of food is done by various method and one of the most common method is cooking. Food by its nature begins to spoil the moment it is harvested. Processing and preservation of food is undertaken to prevent them from spoilage by microorganism (bacteria, yeast, moulds) as well enzymes, temperature and biochemical changes and impart keeping quality or shelf life to the food. Preservation of food is done from the ancient time. the meat or the harvest produce by the ancient man were not completely consumed immediately but was also preserved for the latter use by using the traditional method of preserving food that are sun drying, storage in vinegar etc. today in India more than 40% of food is wasted in raw form which can be utilized for the processing purpose or can also be preserved for later use. Today in developing countries like India there are a wide scope of generating employment by the establishment of food processing and preservation industries. The topic food processing and preservation intends to present innovative solution and integrated approaches to preserve natural food product. The search for new processing and preservation and technologies is really more than hundreds years old, but in the last 20 years food scientist have accelerated this development to newer technologies capable of producing and maintaining a final food product with fresh – like characteristics. Moreover, the goal has been to achieve higher quality product with also ensuring the microbiological safety of the food.

KEYWORDS – Preservation, Processing, Spoilage, cooling, sorting, grading.

ECONOMIC ANALYSIS OF HARVESTING AND TRANSPORTATION INTERVENTIONS OF SUGARCANE IN HARYANA

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ABSTRACT

Sugarcane crop is raised in about 4.2-5.0 million ha area and about 50 per cent of this crop remains as ratoon crop, in general, being a long-duration crop of 12 months and its sowing spreading from October to May, sugarcane is a labour-intensive crop, which requires about 166-325 labour days per hectare (Sharma and Prakash, 2011). Intercultural operation is the single largest consumer of labour in sugarcane cultivation in India. The main components of labour-use in sugarcane cultivation are inter-culture, harvesting and planting operations. Harvesting requires about 85-100 labour days/ha for a normal sugarcane crop. However, the labour-use for harvesting depends upon the yield and condition of the crop at harvesting time, the labour demand per ha for harvesting the cane is higher, if the yield of the crop is higher or the crop has lodged and the canes are not erect. Most of the operations in cane cultivation are carried out manually and the use of machinery is limited to field preparation. Further manual harvesting was divided into cutting, detopping, detrashing, bundle making and loading. The overall average labour-use in manual harvesting was 91.58 mandays/ha. The average highest labour-use was used in cutting i.e. 26.66 per cent followed by detopping (21.70%), bundle making (19.65%), detrashing (18.24%) and loading (13.74%) of the total labour-use. The highest total labour-use was 96.63 mandays/ha in Karnal followed by 92.38 mandays/ha in Yamunanagar and 85.75 mandays in Rohtak district (Table 1). The overall transportation cost of sugarcane by different mean of transportation in Haryana was found Rs. 24.77 per quintal whereas it was Rs. 24.94, 21.64 and 27.99 for Karnal, Y.Nagar and Rohtak respectively. In incentive or support given by sugarmill to farmers was support for purchase of agro-chemicals, online message for supply of cane(100%), subsidized food arrangements at sugarmill (65%) and arrangement of extension services for timely dissemination of production and protection technologies (58.33%).

KEYWORDS: inter-culture, harvesting, cutting, detopping, detrashing

AUGMENTING FARMERS' INCOME THROUGH TECHNOLOGICAL INTERVENTION: A CASE STUDY IN BIHAR, INDIA

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ABSTRACT

India is an agrarian economy based developing country, where agriculture is the major source of livelihood of more than half of Indian population. *Atma Nirbhar Bharat* programme in India started in 2020 towards making Indian citizens independent and self-reliant in all aspects. The major challenges in front of policy makers for the success of the programme is to augment income level of large proportion of agricultural farmers in the country. Climate change severely affects the farmers field crops every year and results loss in the farm productivity. Climate resilient agriculture technologies help the farmers to get more farm productivity and income. This study deals with the result demonstration of Zero Tillage Technology on *rabi* crops in Buxar, Bihar during 2020-21. Demonstration of technologies has been studied on four crops like wheat, chickpea, lentil and mustard on 282 farmers' fields in the selected five villages and compared with farmer practice. A random sample of 100 farmers selected in the five villages and their benefit cost ratio (B:C) and net returns (INR/ha) has been calculated and significant test in difference tested using Z test, which revealed that there is an increase in income in demonstration plot as compared to farmers practices. There is a significant ($p < 0.05$) increase in net income of 19%, 22%, 29.69% and 5.81% and increase in B:C ratio of 18%, 16.9%, 22.6% and 1.85% in wheat, chickpea, mustard and lentil respectively. Results revealed that farmers income and crops benefit cost ratio has increased in technological intervention demonstration plot as compared to local check up to more than 20 % in *rabi* crops in Buxar district of Bihar. Hence, farmers can improve their income level by adopting the technologies that will help them to become self-reliant and independent.

KEYWORDS: Agricultural technology, intervention, climate, *rabi*, crops

IMPACT OF IMPROVED PACKAGE AND PRACTICES OF BOTTLE GOURD UNDER FRONTLINE PROGRAM

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ABSTRACT

Bottle gourd (*Lagenaria siceraria* [Mol.] Standl.) belongs to the family Cucurbitaceae, is one of the most important cucurbitaceous crops in India and grown in rainy season as well as summer season vegetable but its fruits are available in the market throughout the year. It is also known as “poor man’s vegetable” in India. This delicious vegetable is also known by different names such as quash, calabash gourd, doodhi and lauki, birdhouse gourd, trumpet gourd and white flowered gourd. Bottle gourd is used for preparation of burfi, juice, raita, kaporkand, pickles, kofta, doodhi halwa etc. are also common. Nutritional value of bottle gourd per 100 g of edible portion is 96.1% moisture, 0.2 g proteins, 0.1 g fat, 0.5 g mineral, 0.7 mg fiber, 2.5 g carbohydrates, 12 kcal energy, 20 mg calcium, 10 mg phosphorus, 0.2 mg niacin, 0.01 mg riboflavin, 0.03 µg thiamine and it is also rich source of minerals like iron and vitamins like C and B complex. According to the importance, Krishi Vigyan Kendra, Madhopur, West Champaran conducted frontline demonstrations during 2021-22 on 10 farmers field with evaluation the performance of Narendra Shivani variety of bottle gourd and record the feedback information of farmer’s. The results revealed that average yield of bottle gourd under frontline demonstrations were 205.00 q/ ha as compare to 158.20 q/ ha recorded in farmer’s practice. It was received 29.58 percent more over farmer’s practices. The cultivation of bottle gourd under improved technologies gave higher net return of Rs. 238400/ha as compare to Rs. 154000/ha in farmers practices. It was also observed that the benefit cost ratio (B: C) of recommended practice (FLD’s) were 3.84 and 2.93 in farmer’s practice. This may be due to higher yield obtained and lower cost of cultivation under improved technologies compared to local check (farmers practice). Therefore, the results clearly indicates that the use of improved varieties and package and practices with scientific intervention under frontline demonstration programme contribute to increase the productivity and profitability of bottle gourd in Bihar state.

KEY WORDS: Cucurbitaceae, benefit cost ratio, season vegetable

POST-HARVEST TECHNOLOGY: EXTRACTION AND UTILIZATION OF BANANA FIBER FOR EMPLOYMENT

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ABSTRACT

Banana is one of the horticultural plants. India is the world's largest producer of banana fruits and contributes to around 20% of world production. In banana cultivation after harvesting, the valuable part is banana fruit and banana pseudostem is waste material. These pseudostems contain 9-10 layers of the sheath which yield fibers. But these banana stems, which goes to waste due to the non-availability of suitable technology and less knowledge among farmers about extraction methods of banana fiber and utilization of banana fibers in product production. Therefore, research was conducted at Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar to utilize these waste banana pseudostem for extraction of fibers and product development. In this study, a mechanical method was used to extract the fiber from banana pseudostem and training was organized for farm women related to handicraft product development from banana fibers. A pre and post-evaluation of conducted training was done and collected data were analysed by using frequency and percentage. The result of this study shows that after training all trainees can extract the banana fiber as well as able to produce handicraft products for sale purposes. So, this way of utilizing waste banana pseudostem helps in generating employment and income.

KEYWORDS: Banana fiber handicraft, banana fiber extraction, employment generation

REVIEW ON THE IMMUNOMODULATORY ACTIVITIES OF MEDICINAL PLANTS

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ABSTRACT

Medicinal plants have been used by humans for helping to heal immune system. Many medicinal immunostimulants are used for treatment of immune disorders like chronic infectious diseases, hypersensitivity reaction etc. Several immunostimulatory agents cure infection and enhance host immune system. *Ocimum sanctum*, *Asparagus racemosus*, *Withania somnifera*, *Moringa oleifera* and some other medicinal plants having immunomodulatory activity. It's leaves, stem, seeds, flowers, bark, roots are used in immunomodulatory treatment. They contains a multi- nutrients and bioactive compounds like alkaloids, Flavonoids, Terpenoids, Polysaccharides, Lectins, Saponins as immunomodulators. This suggest that medicinal plants can be regarded as immune response modifiers and can be utilized for the development of immunomodulatory agent among plant sources.

KEYWORDS: Immune system, Immunomodulator, Medicinal plants, Bioactive compounds.

ASSESSMENT OF DIFFERENT CROPPING SYSTEMS AND CLIMATE RESILIENT INTERVENTIONS FOR DOUBLING FARMERS' INCOME

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ABSTRACT

A comparative field study was conducted at farmers' field considering farmer's practice (local check) and Climate Resilient Agriculture interventions (Demo) in Sheohar District during Rabi season 2021-22 under Climate Resilient Agriculture (CRA) Program, Bihar which comprises CRA interventions of 6 different cropping system with an objective to find out better cropping system along with CRA intervention in view of doubling farmer's income of the district. The interventions comprises of raised bed planted sole mustard crop (R.Sufam); raised bed planted; sole maize (DMH-1308); sole lentil crop (zero tillage); sole wheat crop var. HD 2967 (zero tillage); sole wheat crop var. HD 2967 (raised bed planting); sole wheat crop var. HD 2967 (community irrigation); sole wheat crop var. HD 2967 (Green seeker based nutrient management); intercropped maize with potato and raised bed sole potato (K.bahar). The area (in acres) under each demonstration were 50, 70, 50, 300, 75, 15, 25, 30 and 3 acres respectively. The grain yield (in q ha⁻¹) obtained for different interventions are: Demo (10.25), Local check (7.5); Demo (101.5), Local check (90.5); Demo (11.5), Local check (8.5); Demo (42.5), Local check (37.5); Demo (39.5), Local check (36.75); Demo (40.75), Local check (37.5); Demo (41.5), Local check (35.8); Demo (42.0), Local check (36.5); Demo (43.8), Local check (36.7); Demo (42.5), Local check (37.5); Demo (103.11+116.115), Local check (83.77+98) and Demo (285), local (262.5) respectively. The benefit cost ratios of these interventions were calculated as: Demo (1.79), Local check (1.4); Demo (3.9), Local check (3.7); Demo (2.86), Local check (2.05); Demo (2.95), Local check (2.18); Demo (2.77), Local check (2.12); Demo (2.85), Local check (2.17); Demo (2.91), Local check (2.07); Demo (3.07), Local check (2.07); Demo (3.07), Local check (2.12); Demo (2.95), Local check (2.18); Demo (4.04), Local check (3.92) and Demo (4.56), Local check (3.5) respectively. By evaluation of above interventions it was observed that intercropped maize with potato system achieved higher B:C ratio and can be practiced for increment in income by farmers of Sheohar district than sole cropping systems.

KEYWORDS: Varieties, NPK dose, Vermicompost, polyhouse and quality fruit yield

ANTIMICROBIAL ACTIVITY, BIOAUTOGRAPHY ANTIOXIDANT ASSAY AND GC-MS ANALYSIS IN *FAGONIA BRUGUIERI* DC.

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ABSTRACT

In the present study, phytochemical analysis was done in a scarce plant *Fagonia bruguieri* DC. The plants were harvested from northwest states of Rajasthan, India. In vitro antimicrobial activity of different concentrations of acetone crude extract was done by agar well diffusion method. Two different nonpolar fractions (benzene and ethyl acetate) were also prepared for bioautography TLC assay. TLC bioautography divulged that Benzene fraction is not separating any antioxidant compound. With solvent system chloroform : ethanol, the ethyl acetate fraction of plant extract was showing three antioxidant compounds. In vitro antimicrobial activity reveals that the crude acetone extract of *Fagonia bruguieri* DC. is capable of inhibiting the growth of *A. niger*, *E. floccosum*, *T. rubrum*, *P. aeruginosa* on all selected concentrations and *P. chrysogenum* on 1mg/ml concentration. Furthermore GC-MS analysis of both non-polar fractions collectively identifies total 33 peaks. ethyl acetate fraction is showing the presence of citric acid which is an organic antioxidant.

KEYWORDS: antioxidant, antimicrobial, bioautography, medicinal plant, GC-MS.

EVALUATION OF MULBERRY FRUIT OF DIFFERENT FRUIT BEARING MULBERRY GENOTYPES FOR ANTIOXIDANT ACTIVITY UNDER TEMPERATE CLIMATIC CONDITIONS

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ABSTRACT

Mulberry though primarily being used as food to silkworm is a multipurpose tree crop. The fruit from this plant either as such or after processed into different products has been in great demand for its health benefits. In the current study five different genotypes of mulberry viz Ensatakasuke, Rokokuyaso, Kanva-2, Botatul and Kokuso-21 evaluated for the biochemical assay, Ensatakasuke has highest TSS (19.2) at par with Kanva-2(18.6). The data for anti-oxidant activity revealed that the anti-oxidant activity in terms of polyphenols, flavonoids, anthocyanin, DPPH and fRAP was found highest in Ensatakasuke followed by Kanva-2. From the Assays it can be depicted that the berry of Ensatakasuke has a great potential to be used in nutraceuticals and pharmaceutical Industry.

KEYWORDS: Anti-oxidants, Mulberry Genotypes, Polyphenols

BIOREMEDIATION OF AGRO-BASED PULP & PAPER MILL EFFLUENT EMPLOYING AUTOCHTHONOUS BACTERIA

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ABSTRACT

Small-scale agro-based pulp and paper mills are characterized as highly polluting industries & are highly water intensive. Concomitant with water consumption, agro-based industries generate large volumes of effluents (~150–200 m³ effluent/ton of paper produced) composed of bio-degradable organic pollutants in the country, standing next only to the domestic sewage. The nature of pulp and paper industry effluent is quite complex as it contains a number of organic components, viz. lignin, tannic acid, resin, cellulose, and hemicellulose which are released into the environment. The environmental impact of wastewater emanated from small-scale pulp and paper mills is therefore of particular concern. Lack of infrastructure, technical manpower, and R & D facilities restricts these mills to recover these chemicals. Therefore, the COD of the emanating stream is quite high. In the above context, efforts were diverted to isolate specific novel bacteria which can survive under such extreme environment and can effectively degrade organic matter present in the pulp and paper industry effluent. Present study exploits biodegradable potential of autochthonous bacteria (e. g. *Pseudomonas*, *Bacillus*, *Pannonibacter*, and *Ochrobacterum*) to treat the industrial effluent from agro-based small-scale pulp and paper mills to bring the wastewater characteristics within the permissible limits involving less retention time. These bacteria were found capable of reducing COD up to 85%–86.5% in case of black liquor and 65–66% in case of back water : black liquor (60:40), respectively, after acclimatization under optimized conditions (pH 6.8, temperature 35°C, and shaking 200 rpm) when the wastewater was supplemented with N and P as trace elements.

KEYWORDS: Effluent; Organic components; COD; Autochthonous bacteria; Lignin; Wastewater

Session – II

CLIMATE CHANGE & AGRICULTURE

IMPACTS OF CLIMATE CHANGE ON THE WATER RESOURCES IN JAMMU & KASHMIR, (INDIA)

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ABSTRACT

Climate change refers to long-term shifts in temperatures and weather patterns. These shifts may be natural, but since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels (like coal, oil, and gas) increasing heat-trapping greenhouse gas levels in the Earth's atmosphere. The Himalayan region is one of the important global freshwater resources. The frequency and intensity of the current extreme weather events and new vulnerabilities with differential spatial and socio-economic impacts on communities are expected to increase as a result of climate change. The impact would be particularly dreadful for developing countries like India. With growing water scarcity, endangered by climate change, springs are likely to perform a vital role in meeting the domestic water demand in future. This paper examines the water quality status of Kashmir valley springs in relation to their geographical location, regional hydrogeological conditions, anthropogenic activities and climate change. The changing weather patterns have also resulted in falling water levels in Kashmir's rivers, which will cause a decline in the state's hydroelectricity generation. It is currently around 2,457.96 MW, comprising 758 MW in the state sector, 1,680 MW in the central sector and 17.5 MW in the private sector. "The present weather conditions will have an adverse impact upon power generation this year as the water level in the rivers has already started receding," N. A. Kakroo, general manager of the State's Power Development Corporation, told IPS.

KEYWORDS: Climate change, Global, Socio-economic, Geographical location and Rivers

SPLIT DOZE APPLICATION FOR FROST MITIGATION AND YIELD IMPROVEMENT IN MULBERRY UNDER KASHMIR CONDITIONS

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ABSTRACT

Mulberry (*Morus Sps*), a fast growing, deciduous, woody perennial angiosperm has an ability to grow as bush, dwarf and tree under varied agro climatic conditions. It produces leaf which is the only food to silkworm (*Bombyx mori* L), a monophagous insect. The plant responds well to application of fertilizers and produces 02 flushes of leaf under Kashmir climatic conditions. Despite the fact that the leaf and biomass production is more during the 2nd flush, major portion of the chemical fertilizers is applied during the first flush which may lead to in-efficient nutrient utilization causing reduction in growth and yield. The present study conducted to see the influence of split doze application of NPK for frost mitigation and yield improvement in mulberry under Kashmir Conditions has led to the conclusion that splitting of nitrogen into three splits and Potassium into two splits helps in reducing extent of frost damage in spring besides improving the annual leaf yield in mulberry.

KEYWORDS: mulberry, leaf yield, frost damage, spring and autumn.

YIELD ATTRIBUTES AND YIELD OF LINSEED (*LINUM USITATISSIMUM* L.) AS AFFECTED BY PHOSPHORUS AND SULPHUR APPLICATION GROWN UNDER SANDY LOAM SOIL

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ABSTRACT

A field experiment was conducted to determine the effect of different levels of phosphorus (P) and sulphur (S) on yield attributes and yield of linseed. The experiment was laid out in randomized block design (RBD), with nine treatments with three replications, in the *Rabi* season of 2022 with three different levels of P (40, 50 and 60 kg P₂O₅/ha) and S (30, 40 and 50 kg S /ha) at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P). Application of P and S significantly influenced the yield attribute and yield of linseed. Addition of recommended dose of fertilizer (RDF) + 50 kg P ha⁻¹ + 50 kg S ha⁻¹ recorded the highest capsules/plant (51.68), number of seed/plant (7.64), test weight (8.28 g), seed yield (946.52 kg ha⁻¹), straw yield (2417.19 kg ha⁻¹), biological yield (3660.85 kg ha⁻¹) and harvest index (36.44%). However, the same treatment noted the maximum gross return (Rs. 130584.30), net return (Rs. 79444.30) and B:C ratio (1.55). In conclusion, it is inferred from the present investigation that application of RDF + 50 kg P ha⁻¹ + 50 kg S ha⁻¹ in addition to the full doses of N and K is recommended for obtaining highest yield attribute and yield of linseed. Moreover, the same treatment recorded the maximum gross return, net return and B:C ratio.

KEYWORDS: Benefit cost ratio, Linseed, Phosphorus, Relative growth rate, Yield

SUSTAINABLE INCOME GENERATION THROUGH INTEGRATED FARMING SYSTEM OF FARMERS OF BHILWARA DISTRICT IN RAJASTHAN

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ABSTRACT

Today's environment, increasing demand for meat in rural and urban areas can help small and part-time farmers earn good profits by trading with the goat and poultry farming. Because of less investment and maintenance costs for shed, it can be done in coordination with agriculture crops. The present study was carried out in Mandelgarh block of Bhilwara district in Rajasthan to find out a sustainable and economically viable mixed farming model by integrating different components like crop, goat and poultry on 1.5 acre land holding. A farming system model having 10 goats + 20 poultry birds along with crop cultivation was found the best suitable with a net income of Rs 60260/- year as compared to crop cultivation alone i.e. Rs 21980/ year with a benefit cost ratio of 1: 2.80 and employment generation of 280 days. Integrated farming system help adequate amount of feed was also available for animals. Based on the study it is inferred that integrated farming system with 10 goats along with other components like; poultry is the most significant and beneficial system which can sustainable the income of farmers to improve their nutritional and livelihood security.

KEYWORDS: Sustainable. Integrated farming, income, employment, land holding

APPLICATION OF PHOSPHORUS AND SULPHUR EFFECTS GROWTH ATTRIBUTES AND GROWTH RATE OF LINSEED (*LINUM USITATISSIMUM* L.) GROWN UNDER MIDDLE GANGETIC PLAN

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ABSTRACT

A field experiment was conducted to determine the effect of different levels of phosphorus (P) and sulphur (S) on growth attributes and growth rate of linseed. The experiment was laid out in randomized block design (RBD), with nine treatments in the *Rabi* season of 2022 with three different levels of P (40, 50 and 60 kg P₂O₅/ha) and S (30, 40 and 50 kg S /ha) at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P). Application of P and S significantly influenced the growth attributes and growth rate of linseed. Conjoint application of recommended dose of fertilizer (RDF) + 50 kg P ha⁻¹ + 50 kg S ha⁻¹ recorded the highest plant height 41.66 and 60.02 cm at 60 and 90 DAS, respectively whereas, number of branches per plant documented maximum value 4.86 and 9.81 at 60 and 90 DAS. The same treatment (T6) showed the maximum crop growth rate (5.92 and 9.19 g/m²/day) and relative growth rate (4.86 and 9.81 g/g/day) at 30 – 60 and 60 – 90 DAS, respectively. In conclusion, it is inferred from the present investigation that application of 50 kg P ha⁻¹ + 50 kg S ha⁻¹ in addition to the full doses of N and K is recommended for obtaining maximum growth attributes and dry matter weight in linseed.

KEYWORDS: Crop growth rate, Linseed, Phosphorus, Relative growth rate, Sulphur

STEP TOWARDS MAPPING OF HELMINTHOSPORIUM LEAF BLIGHT RESISTANT GENES IN OATS

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ABSTRACT

The oat crop has been neglected due to its use in limitation as a forage crop rather than a staple food in most of the countries throughout the world. In the Punjab, particularly the Ludhiana region, it is also more susceptible to foliar diseases, particularly Helminthosporium leaf blight (HLB, syn. Pyrenophora leaf spot) disease. It was an emerging disease that can cause forage yield losses of up to 50% across the range when it infects over 70% of the field. Thus, 167 germplasm lines were evaluated for disease severity and infection using a 1–9 scale in this study by being artificially inoculated with fungal spores. Based on the level of infection, these lines were divided into four clusters, with clusters 2 and 3 receiving the vast majority of the infections (more than 50%). From very sensitive (more than 75% infection) to moderately resistant (20-22% infection), lines were classified. Both disease progression investigations and a hybridization programme employed these opposing lines to create populations for upcoming mapping research. Using 220 SSR markers, 47 of which were polymorphic, the contrasted lines were examined for polymorphism. The current research project is also mapping HLB resistance genes and QTLs; this will be the first study to map the resistance genes and QTLs in oats throughout India and the rest of the world. Additionally, identified lines can be utilised in a future breeding operation.

KEYWORDS: foliar diseases, Helminthosporium, hybridization programme

ZERO TILLAGE TECHNOLOGY AS A PATHWAY FOR WHEAT (*TRITICUM AESTIVUM* L.) PRODUCTIVITY AND PROFITABILITY IN NORTH WEST ALLUVIAL PLAIN ZONE OF WEST CHAMPARAN DISTRICT, BIHAR

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ABSTRACT

Farming practices in the Indus-Ganges basin for the most part are centered on the cultivation of rice and wheat, which form the central components of many different rice-wheat farming systems. Nowadays, in the context of climate change, economic uncertainties, burning of crop residues, and social pressure to mitigate agriculture externalities, farmers have to adopt new cropping systems to achieve a sustainable and cost-effective grain production to attain food security for growing population. In recent years, a "tillage revolution" has started to address many of these problems. Use of zero tillage technology to establish wheat after rice. This enables farmers to sow and harvest wheat earlier than normal, allowing them to introduce an additional crop into their annual rotation. Rice-wheat is the most common cropping system of North West Alluvial Plain Zone of West Champaran, Bihar. However, in view of emerging new challenges like yield stagnation, soil degradation, shift in weed flora and appearance of insect-pests and diseases, other options for the establishment of the system have been felt essential. The zero-tillage technology is economical, time saving, increase fertilizer use efficiency and play an important role for improvement of soil health. Considering the facts, Krishi Vigyan Kendra, West Champaran-I & II demonstrated 750 farmers' participatory trials on wheat crop through zero tillage technology under climate resilient agriculture program during 2020-21 and 2021-22. The finding has clearly established that wheat sowing can be advanced at least 1-15 days over conventional tillage (broadcasting method), enabling to harvest an advantage that cannot be obtained by using recommended varieties for late sown condition. The critical field observation revealed that the technology has merit for promotion and technical feasibility with an opportunity for providing self-employment through custom hiring services. Subject to further investigation on long term impact of the technology on soil health and productivity of the system, it definitely provides answer for economic security in future specially with multifarious use of the machine in the district West Champaran of Bihar and also opening new vistas for resources conservation whether fuel, crop residues, seed, water, fertilizer, man power or wear and tear of machinery are concerned. The results have also shown an increase in the productivity of the wheat by about 6.12 q/ha and 6.31 q/ha over conventional tillage during 2020-21 and 2021-22, respectively. In addition to that saving in fuel consumption in field preparation as well as in sowing of wheat under zero tillage was ranging 45 liter/ha as compared to the conventional tillage, economizing the cost of seed and its seeding up to Rs. 3100/ha and saving in irrigation by Rs. 2000/ha over conventional practices. The net returns of Rs. 40305/ha and Rs. 54549.40/ha were received by the farmers under zero-tillage technology while it was Rs. 31125/ha and Rs. 31834.75/ha in conventional tillage during 2020-21 and 2021-22, respectively. Thus, the overall net profitability gain of worth Rs. 9180/ha and Rs. 22714.65/ha over conventional tillage during 2020-21 and 2021-22, respectively. Seeding of wheat with zero tillage technology has proved economically viable, technically feasible, and compatible with the existing farming system and it also appears good attraction for the farmers to adopt the technology on large scale.

KEYWORDS: Zero Tillage, North West Alluvial Plain Zone, Wheat, Rice-Wheat Cropping System

EVALUATION OF GRAPE RAISIN VARIETIES UNDER NORTHERN DRY ZONE OF KARNATAKA

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ABSTRACT

Four different grape raisin varieties were evaluated under northern dry zone of Karnataka. The study was conducted during October 2020 to February 2021 at Horticulture Research and Extension Centre, Vijayapur (Tidagundi). The experiment was carried out using randomized block design with 5 replications. The varieties were evaluated for growth, yield and quality parameters of the grape raisin. Among the different varieties evaluated, the minimum number of days taken to bud burst (9 days), highest number of fruitful canes per vine (43.20), highest leaf area (186.06 cm²), maximum shoot length (76.42 cm) and shoot girth (8.03 mm) at 60 days after fore pruning was recorded in Thompson Seedless. The performance with respect to yield pointed out that the variety Thompson Seedless took a smaller number of days for panicle appearance (18.40 days). While, minimum number of days for harvesting (130.80 days) was noted in Manjari Kishmish. The highest number of bunches per vine (54.20), maximum number of berries per bunch (216), the maximum weight of 100 berries (172.60 g), berry length (17.46 mm) and berry diameter (14 mm), bunch weight (313.40 g), bunch width (10.26 cm), yield per vine (16.84 kg/ vine and 40.43 t/ ha), maximum raisin length (16.46 mm) and diameter (8.66 mm) were recorded in Thompson Seedless which was followed by Manjari Kishmish. While, the maximum bunch length was recorded in 2A-Clone (22.75 cm). With respect quality parameters, the highest raisin recovery percentage (26.61 %) was recorded in Merbein Seedless. The highest TSS (24.18 °B) and minimum titratable acidity (0.42 %) were recorded in Thompson Seedless (15.01 %). 2A-Clone recorded maximum reducing sugar content (67.07 %), total sugar content (68.87 %) and Manjari Kishmish recorded maximum non reducing sugar content (2.20 %). The organoleptic score on overall acceptability (8.50) was highest for the raisin of Thompson Seedless. Considering overall parameters Thompson Seedless was found better followed by Manjari Kishmish under northern dry zone of Karnataka.

KEYWORDS: Manjari Kishmish, Grape raisin

GROWTH AND YIELD PERFORMANCE OF VARIOUS WHEAT VARIETIES IN NORTH WEST ALLUVIAL PLAIN ZONE

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ABSTRACT

One of the major important cereal crops of India is wheat (*Triticum aestivum*) and it plays an important role in economy as well as the food security of the country. In year 2020–2021, wheat production in India was over 109 MMT from 31.6 million hectares and shares around 37% of total food grain production. However, the agricultural production is seriously threatened by climate change, and conventional farming methods are particularly vulnerable in this situation. Krishi Vigyan Kendra, Narkatiaganj conducted a field experiment for two consecutive years to observe the performance of twenty three different wheat varieties in the agro-climatic zone of north-west alluvial plain zone to observe the impact of agro-climatic condition on growth and yield performance of wheat varieties. The data revealed that plant height ranged from 76–121 cm whereas, lowest height was in black wheat and highest in blue wheat. The maximum 9.0 tillers/plant was documented in blue wheat however, minimum 5.3 tillers/plant was noted in PBW–01. In case of internode length, maximum 21 cm was showed by blue wheat and minimum 12 cm was in HI–8737 variety. Shonamati variety recorded the lowest spike length 4.4 cm while, blue wheat has the highest spike length *i.e.*, 16.7 cm. The maximum grain and straw yield was showed by HI–8713 variety (66 and 147 q/ha, respectively) whereas, black wheat noted the minimum grain and straw yield (13 and 31 q/ha, respectively). Therefore, it was concluded that in north-west alluvial plain zone adoption of high yielding HI–8713 variety would be beneficial for the farmers.

KEYWORDS: Narkatiaganj, Plant height, Spike length, Wheat, Yield

IMPACT OF VARIOUS RICE AND WHEAT PRODUCTION TECHNOLOGIES ON PRODUCTIVITY AND PROFITABILITY UNDER THE CLIMATE RESILIENCE AGRICULTURAL PROGRAMME

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ABSTRACT

Worldwide agricultural production is seriously threatened by climate change, and conventional farming methods are particularly vulnerable in this situation. To promote climate resilient agricultural practices, Krishi Vigyan Kendras Madhopur and Narkatiaganj, implemented several climate smart interventions through farmers' participatory demonstrations in rice and wheat cultivation in five adopted villages which are the staple food in this region. In *Rabi* season of 2021-2022, wheat has been demonstration in 430 acres of land whereas, in *Kharif* season of 2021, rice has been demonstration in 555 acres of land in the villages of Jhakhara, Gahiri, Telua, Baikunthwa and Pakaria under Nautan block, West Champaran district of Bihar. The observation revealed that, among the five different interventions in rice, assured irrigation based rice cultivation recorded the highest rice yield (55.7 q ha⁻¹) followed by nutrient expert based nutrient management in rice (47.2 q ha⁻¹), transplanted rice (44.6 q ha⁻¹), water harvesting and field bunding technique (40.7 q ha⁻¹) and alternate wetting and drying method of irrigation (38.8 q ha⁻¹). However, B:C ratio follows the order as: nutrient expert based nutrient management (2.61) > transplanted rice (2.54) > water harvesting and field bunding technique (2.30) > assured irrigation based rice cultivation (2.20) > alternate wetting and drying method of irrigation (2.18). In case of wheat, three interventions has been adopted and the maximum yield was noted under community irrigation based wheat production (52.9 q ha⁻¹) followed by nutrient expert based nutrient management (43.8 q ha⁻¹) and wheat sowing under zero tillage (41.9 q ha⁻¹). Moreover, B:C ratio follows the order as: community irrigation-based wheat production (3.55) > nutrient expert based nutrient management (2.96) > wheat sowing under zero tillage (2.82). The study came to the conclusion that effective water management, minimal soil disturbance and the application of appropriate nutrient management strategies enhances rice and wheat productivity while reducing cultivation costs.

KEYWORDS: Climate resilience agriculture, Nutrient management, Rice, Wheat, Water management

POTATO AND MAIZE INTERCROPPING: A WAY TOWARDS ECO-FRIENDLY PEST MANAGEMENT AND ENHANCING PRODUCTIVITY

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ABSTRACT

Intercropping of potato with maize is one such technology and KVK, Narkatiaganj and Madhopur has demonstrated 30 acre land under such intervention in five adopted villages of West Champaran, Bihar under the climate resilient agriculture programme. Land equivalent ratio (LER) > 1.0 indicated a yield advantage for intercrop and under maize-potato intercropping system the LER value was 2.27. Maize and potato yield increased by 6.23% and 21.28%, respectively over the farmers practices (sole limit crop) under maize-potato intercropping system and reduces the potato tuber moth population by increasing several natural enemies including parasitoids (e.g., *Copidosoma koehleri* Blanchard; *Diadegma pulchripes* (Kokujev); *Temelucha decorate* (Gravenhorst); *Bracon gelechia* Ashmead) and predators (e.g., *Coccinella septempunctata* Linnaeus; *Chrysoperla carnea* Stephens; *Orius albidipennis* (Reuter)). The practice of intercropping of potato with maize markedly reduces the incidence and rate of disease development of bacterial wilt (*Pseudomonas solanacearum*) and Rhizoctonia rot (*Rhizoctonia solani*) in the potato crop due to the effect of increased distances between individual potato plants, their spatial arrangement and the presence between potato plants of root systems of other plant species, all of which resulted in a reduction in plant to plant transmission, *via* the roots. The average corresponding net returns from maize and potato crop was Rs. 49,250/ha and Rs. 1,01,000/ha under maize-potato intercropping system however, farmers were obtained only Rs. 43,250/ha and Rs. 71,000/ha, respectively by their own practices. On an average benefit cost ratio of maize and potato was 1.92 and 2.40, respectively under demonstrated technology while, it was 1.80 and 2.01 in farmer's practices, respectively. Thus, maize-potato intercropping not only give the yield and economic advantages but also decreases the insect pest outbreak to the crops.

KEYWORDS: Inter cropping, Land equivalent ratio, Maize, Parasitoids, Potato

YIELD GAP ANALYSIS OF SUMMER MUNGBEAN (*VIGNA RADIATA*) THROUGH ON FARM DEMONSTRATION OF ZERO TILLAGE TECHNOLOGY IN GAYA, BIHAR

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ABSTRACT

Mungbean also called green gram (*Vigna radiata*) is an important pulse crop of India and serves as major source of dietary protein for majority of vegetarian Indian population. During year 2020-21, India produced 3.09 million tonnes of mungbean from an area of 5.13 million ha with average productivity of 0.6 t/ha. It is mainly grown in kharif season but in recent years, its area has increased considerably in summer season also due to increased irrigation facilities, availability of short duration varieties and better price. Zero tillage technology can be used to save time and labour with reduced cost of cultivation and more profit to farmers. Current study was undertaken to analyse the yield gap in summer mungbean through large scale demonstration of zero tillage mungbean technology at farmers' field in five selected villages of Gaya district of Bihar. Foundation seeds of mungbean (var. IPM-2-3), weedicides and necessary technical support were provided to 190 farmers during summer season of 2021 and 2022 under climate resilient agriculture programme of Government of Bihar. Observations on both yield level and income of both demonstration plots and farmer's practice were recorded and averaged to analyse the extension and technology yield gap. Results shown that average yield of zero tillage mungbean was 0.85 t/ha while yield level in farmer's practice was 0.76 t/ha. Thus, extension yield gap was observed to be 12.5%. Keeping in mind the potential yield of IPM-2-3 is 1.2 t/ha, technology yield gap was assessed to be 40.35 per cent. Comparison was also made based on net income generated from zero tillage mungbean and farmers' practice. It was observed that net return was 26.22 higher in zero tillage mungbean. The difference was mainly due to higher yield and reduction in cost of cultivation under zero tillage mungbean cultivation. Therefore, zero tillage coupled with quality seeds of high yielding varieties can provide additional income to farmers during summer season.

KEYWORDS: Zero tillage technology, yield gap, mungbean, lentil, demonstration

MULTI ENVIRONMENTAL EVALUATION AND CHARACTERISATION OF RECOMBINANT INBRED LINES (RILS) IN WHEAT (*TRITIMUM AESTIVUM* L. EM. THELL) UNDER TERMINAL HEAT STRESS CONDITIONS

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ABSTRACT

Wheat is third most important cereal crop grown worldwide and is staple source of diet for millions of people all over world. However, the IPCC report of 2022 has warned that the global average temperature is set to further increase by 1.5°C within next two decades and thus resulting in the world reaching the irreversible tipping points of a potential climate crisis. In this changing scenario, wheat crop is prone to heat stress both at early and maturity stages. Heat stress restricts wheat production and productivity. Hence, in the present investigation, recombinant inbred line population consisting of 200 lines, was developed by crossing PBN51(heat tolerant) with Raj4014(heat susceptible). The population along with the parents were evaluated under timely sown and heat stressed conditions at three locations for two years namely, GBPUAT, Pantnagar, SKAUST, Jammu and IAS, BHU. Morpho-physiological traits like number of grains per spike, number of spikelets per spike, grain filling duration, thousand grain weight, canopy temperature and relative chlorophyll content were determined. Combined analysis of variance showed significant GenotypeXEnvironment interaction for all the traits. The lines 143, 5, 132, 156 and 97 were found to have higher mean yield and stable across all environments. The late sown condition of second year at Jammu was found to be a good representative of the mega environments and the timely sown condition of second year of Pantnagar was found to be highly discriminative of lines for grain yield per plot.

KEywords: cereal crop, heat tolerant, heat susceptible

IMPACT OF CLIMATE CHANGE ON SOIL, BIO-RESOURCES & BIODIVERSITY

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ABSTRACT

Climate Change is a result of many external factors which change the long term pattern of our environment. Basically long term shift in temperature & weather pattern is what climate change is about. Climate Change has adversely affected soil quality & its nature. Many soil properties are affected by changes in temperature & rainfall. Climate Change, along with Habitat destruction & pollution, is one of the important stressors that can contribute to species extinction. It can overwhelm the capacity of ecosystem to mitigate extreme events & disturbance, such as wildfires, floods & drought. Climate Change is already a reality even if all Anthropogenic emissions were to stop, changes would continue into the future. The latest report (WG III) focuses on how we limit further climate change. Climate change happening due to Natural factors & mainly because of human activities. International Institute of Sustainable Development (IISD) study published in 2021, suggested removing Fossil Fuel Subsidies for consumers across 32 countries would reduce Greenhouse Gas emissions by an average of 6.1% by 2030. There is a compelling scientific evidence that human activities have influenced these changes in regional climate. The impact of climate change on biodiversity & Food security has been recognized. Greenhouse gas (GHG) emission continue to rise & current plans to address Climate change are not ambitious enough to limit warming to 1.5° C above pre-industrial level (IPCC REPORT). When it comes to working with nature to fight climate change, we can't achieve effective action without the leadership of Indigenous People's & Local Communities (IPLCs). The latest IPCC Report shows that only 24 countries in the world are actually reducing their emissions. One effective way to protect nature is to invest more in nature itself. Changes in Policy at Governmental level in efficient manner is what needed to overcome Climate Change problem. The IPCC estimates, it would cost about \$400 Billion to make changes to Agriculture, Forestry, Biodiversity, Ecosystem & other land uses required to limit emissions.

KEWORDS:: Climate Change, Soil, Environment, Anthropogenic, Ecosystem Disturbance, Nature, Biodiversity, Pollution

FRONTLINE DEMONSTRATION OF ECO-FRIENDLY TRAP FOR MANAGEMENT OF FRUIT FLIES IN MANGO

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ABSTRACT

Mango is considered as the king of fruits because of its large area, production, delicious taste, nutritional importance. Bihar has large area of mango cultivation. A large area under West Champaran district of Bihar is important mango belt of the state due to large area of mango orchards. The Oriental fruit fly, *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae) is a direct pest on mango. The loss in fruit yield ranges from 1 to 31% with a mean of 16% in mango. At present, majority of mango growers mainly depend on synthetic pesticides for this pest. Most of the pesticides are more toxic to beneficial insects (such as parasites of pest insects) than to fruit flies and causes several ill effects. Since, the maggots damage the fruits internally; it is not a practical approach to control this pest by using insecticides. Therefore, there is a need to explore alternative methods of control. Krishi Vigyan Kendra, Madhopur (West Champaran) under Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur has made sincere efforts to introduce and popularize the recently introduced; Use of methyl eugenol based pheromone traps as an eco friendly, cost effective and feasible approach for the management of fruit flies so that mango growers may get maximum productivity and meet out the required quality. The traps and lure (Methyl eugenol) for fruit fly were distributed, among 10 farmers of different villages of district, for installation @ 10 traps/ acre in Mango orchards under the front line demonstrations programme of KVK. On an average of the data of the demonstration of technology at farmer's field, 37 percent increased in mango yield was obtained by the farmers. Approximately 6.5 percent fruits were found infested in the orchards fixed with fruit fly traps as compared to 41.1 per cent in farmers practice without trap. This technology improved life style and socio economic status of the farmers.

KEYWORDS: mango growers, eco friendly, cost effective, feasible approach

CLIMATE RESILIENT TECHNOLOGIES QUINTESSENTIAL FOR REVAMPING SUSTAINABILITY AND ADDRESSING THE SEQUELA OF CLIMATE CHANGE ON CROP PRODUCTION

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ABSTRACT

Population of India is expected to touch more than 1500 million by 2030; and land under agriculture is decreasing per year. Beside this intensive agriculture is putting immense pressure on land to produce more food accelerate the process of land degradation. Ever increasing challenge of climate change and threats posed by extreme weather further compound the vulnerability of small holders' livelihoods and food security. Bihar's food security which aims at sustainable agricultural production is extremely dependent on climate change. Conservation agriculture and eco-friendly technological interventions through improved crop establishment serves as need of the hour to produce more with fewer resources vis a vis mitigating climatic vulnerabilities and protecting natural resources for sustainable growth. Keeping this in backdrop different interventions viz Zero tillage wheat and Direct Seeded Rice were implemented in the year 2021-22 on Farmer's field on mass level under Climate Resilient Agriculture Programme (CRA Programme) started in East Champaran district of Bihar state during the year 2020. The older practices like transplanting of paddy and sowing of wheat through conventional tillage was replaced by newer scientific interventions like Direct seeded Rice (DSR) and Zero Tillage (ZT) wheat, respectively. The results of the demonstrations carried out revealed that the grain yield of ZT wheat (4.25 t ha⁻¹) was 17.72 % higher than conventional tillage (3.61 t ha⁻¹) in sequence with DSR the yield was 4.60 t ha⁻¹ which was 25.34 % higher than paddy transplanting (3.67 t ha⁻¹). Furthermore, the soil fertility was found to be enhanced in DSR Paddy and ZT wheat, alongside with resource conservation can lead to sustainable production model of the crops.

KEYWORDS: Climate Change, DSR, Zero tillage, Crop Production, Yield

IMPACT OF VARIOUS RICE AND WHEAT PRODUCTION TECHNOLOGIES ON PRODUCTIVITY AND PROFITABILITY UNDER THE CLIMATE RESILIENCE AGRICULTURAL PROGRAMME

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ABSTRACT

Worldwide agricultural production is seriously threatened by climate change, and conventional farming methods are particularly vulnerable in this situation. To promote climate resilient agricultural practices, Krishi Vigyan Kendras Madhopur and Narkatiaganj, implemented several climate smart interventions through farmers' participatory demonstrations in rice and wheat cultivation in five adopted villages which are the staple food in this region. In *Rabi* season of 2021-2022, wheat has been demonstration in 430 acres of land whereas, in *Kharif* season of 2021, rice has been demonstration in 555 acres of land in the villages of Jhakhara, Gahiri, Telua, Baikunthwa and Pakaria under Nautan block, West Champaran district of Bihar. The observation revealed that, among the five different interventions in rice, assured irrigation based rice cultivation recorded the highest rice yield (55.7 q ha⁻¹) followed by nutrient expert based nutrient management in rice (47.2 q ha⁻¹), transplanted rice (44.6 q ha⁻¹), water harvesting and field bunding technique (40.7 q ha⁻¹) and alternate wetting and drying method of irrigation (38.8 q ha⁻¹). However, B:C ratio follows the order as: nutrient expert based nutrient management (2.61) > transplanted rice (2.54) > water harvesting and field bunding technique (2.30) > assured irrigation based rice cultivation (2.20) > alternate wetting and drying method of irrigation (2.18). In case of wheat, three interventions has been adopted and the maximum yield was noted under community irrigation based wheat production (52.9 q ha⁻¹) followed by nutrient expert based nutrient management (43.8 q ha⁻¹) and wheat sowing under zero tillage (41.9 q ha⁻¹). Moreover, B:C ratio follows the order as: community irrigation based wheat production (3.55) > nutrient expert based nutrient management (2.96) > wheat sowing under zero tillage (2.82). The study came to the conclusion that effective water management, minimal soil disturbance and the application of appropriate nutrient management strategies enhances rice and wheat productivity while reducing cultivation costs.

KEYWORDS: Climate resilience agriculture, Nutrient management, Rice, Wheat, Water management

INDIRECT IMPACT OF LOCKDOWN (DUE TO COVID-19) ON CLIMATE CHANGE

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ABSTRACT

The worldwide disruption caused by the COVID -19 pandemic has resulted in numerous impacts on the environment and the climate. The considerable decline in planned travel by the people has caused many regions to experience a large drop in air pollution. In China and some other countries, lockdowns and other measures resulted in a 25 per cent reduction in carbon emissions and 50 per cent reduction in nitrogen oxides emissions. Other positive impacts on the environment include governance-system-controlled investments towards a sustainable energy transition and other goals related to environmental protection. However, the outbreak has also provided cover for illegal activities such as deforestation of the Amazon rainforest in South America and poaching in Africa, hindered environmental diplomacy efforts, and created economic fallout that some predict will slow investment in green energy technologies. Up to 2020, increases in the amount of greenhouse gases produced since the beginning of the industrialization era caused rise in the Earth's average global temperatures, causing effects including the melting of glaciers and rising sea levels. In various forms, human activity caused environmental degradation, an anthropogenic impact. Prior to the COVID -19 pandemic, measures that were expected to be recommended to health authorities in the case of a pandemic included quarantines and social distancing. Prior to the COVID -19 pandemic, researchers argued that reduced economic activity would help decrease global warming as well as air and marine pollution, allowing the environment to slowly flourish. Researchers and officials have also called for biodiversity protections to form part of COVID -19 recovery strategies. In this chapter, authors are discussing about the various types of indirect impacts lockdown on climate change. Some of the changes are like air quality, water quality, wildlife, deforestation and reforestation, carbon emissions, food production, litter, investments and other economic measures, weather forecasts, predicted rebound effect, psychology and risk perception etc.

KEYWORDS: Climate Change, Sustainable Development, Lockdown, Carbon emissions, Coronavirus, AQI, GHGs

INTERACTIONS WITH SCIENCE, AGRICULTURE AND MANAGEMENT WITH CLIMATE CHANGE

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ABSTRACT

Rice (*Oryza sativa L*) is the second largest crop grown in the world in terms of both area and production after maize and is grown on about 11 per cent of the total cultivated area globally. Rice serves as staple food for more than half of world's population and is the primary source of nutrition for 65 per cent of India's population. The annual losses due to diseases in rice are estimated to be 10-15 per cent worldwide. Among the fungal diseases, brown spot caused by *Drechslera oryzae* (Breda de Haan) Subramanian and Jain is most important disease of rice which occurs in almost all the rice growing areas of the country and cause yield loss upto 52 per cent when protective measures are not taken. In the present investigation, the pathogen *D. oryzae* was subjected to different cultural conditions viz., media, temperature, and nutrient source *in vitro*. Among the different media tested, maximum and minimum mycelial growth was recorded on rice leaf decoction agar (83.48 mm) and malt extract agar (28.30 mm), respectively. The sporulation was found in traces in rice leaf decoction agar and potato dextrose agar. In case of different temperature levels, maximum mycelial growth of 75.64 mm was recorded at 30°C while minimum mycelial growth of 15 mm was recorded at 15°C and sporulation was found in traces in the pathogen isolate incubated at 25°C and 30°C. Among different carbon sources tested, maximum dry mycelial weight was recorded in glucose (552.20 mg) and minimum in sucrose (98.32 mg) while the sporulation was found in traces in glucose only. Among different nitrogen sources tested, peptone (353.20 mg) recorded maximum dry mycelial weight and minimum growth was found in ammonium nitrate (47.60 mg). However, sporulation was found in traces in peptone only.

KEYWORDS: Brown spot, *Drechslera oryzae*, Physiological studies, Rice

VARIETAL PERFORMANCE OF CAPSICUM FRUTESCENCE (SHIMLA MIRCH) IN POLYHOUSE CULTIVATION DURING CLIMATE CHANGE SCENARIO

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ABSTRACT

Capsicum is a high return providing cash vegetable. It may play a vital role in doubling the farmers income from per unit area. But in the State appropriate package of practices for Capsicum cultivation in polyhouse has not been standardized. I have taken 5 Varieties collected from different institutions of ICAR California wonder (IARI), Pusa Deepti (IARI), Arka Bharat (IIHR), Arka Gaurav (IIHR), Arka Mohini (IIHR) and field experiment was conducted at Hi-Tech Horticulture playhouse, of RPCAU, Pusa with 5 varieties in three replication. Basic recommendations of polyhouse cultivation regarding manure and fertilizers 3.0 kg Vermicompost/m² + NPK (RDF) 80:40:40 g /m². has been followed. During the crop period growth data plant height, number of branches per plant, number of fruits per plant, fruit length, fruit width and yield data- weight per fruit(g.), yield per plant(kg) and yield per ha (q.) has been recorded and analysed. Arka Bharat (IIHR) variety performed best among all five, and it gave maximum fruit length, number of fruits per plant, weight per fruit, yield per plant, and per hectare. In respect of B:C ratio also followed by California wonder, Arka Mohini, Arka Gaurav and Pusa Deepti.

KEYWORDS: California wonder (IARI), Pusa Deepti (IARI), Arka Bharat (IIHR), Arka Gaurav (IIHR), Arka Mohini (IIHR)

Session – III

RECENT TRENDS IN HUMAN & ANIMAL HEALTH MANAGEMENT

EFFECT OF FEEDING A RUMEN MODIFIER ON NUTRIENT UTILIZATION, GROWTH PERFORMANCE AND METHANE PRODUCTION IN CROSSBRED HEIFERS

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ABSTRACT

The goal of this study was to find a powerful rumen modulator that will decrease methanogenesis while also improving animal performance. The project was split into two halves. Phase I included a twenty-one-day pre-experimental trial to prepare the animals for the trial without a rumen modulator. The phase II was conducted for 120 days with a mixture of rumen modifiers that included neem seed powder (*Azadirachta indica*), fennel seed (*Foeniculum vulgare*) and harad (*Terminalia chebula*) mixed in a concentrate mixture. The amount of Rumen modifier needed was determined based on the dry matter intake of heifers. There were 21 animals in all in the trial, which was divided into three treatments. The first treatment was a control therapy without the use of a rumen modification. In second treatment used a rumen modifier @ 2%, while in the third treatment used a rumen modifier @ 4%. The treatment that included soybean straw as dry fodder, Lucerne as a green fodder, and a concentrate mixture had no significant ($P>0.05$) influence on the animals' body weight gain, digestibility coefficient, or dry matter intake. Treatment two, in which seven animals were fed dry soybean straw, green lucerne, and a concentrate mixture with a herbal feed additive, rumen modifier powder, at a rate of 2% of dry matter intake, produced the greatest outcomes of all the treatments. The weight of the animals grew significantly ($P<0.01$) by 63.45 kg, whereas the dry matter intake increased significantly ($P<0.01$) from 6.55 to 7.15 kg. In treatment two, the digestibility coefficient shows excellent results. When compared to the control group, it increases considerably ($P<0.01$) by 63.45% in treatment two. Throughout a 120-day experimental trial, methane production was significantly reduced ($P<0.01$) in treatment two. Methane levels in treatment two were 37.30 grams per day, while they were 71.68 gram per day in the control group. In comparison to the control group, treatment two with a 2% rumen modifier showed a considerable reduction in methane output. The rumen modulator had a substantial influence ($P<0.01$) on daily dry matter intake (kg/d), average daily growth, feed conversion ratio, nutrition plane, and digestibility (percent) of CP, EE, NDF, and ADF. In the T2 group, methane production (l/kg DDMI) was reduced by 80% ($P<0.05$) when compared to the T1 (control) group. The T2 group's growth performance and immunological response were improved ($P<0.05$) by feeding rumen modification. The study concluded that feeding rumen modifier @ 2% DMI to crossbred heifers can reduce methane emissions, resulting in less dietary energy loss and improved immunological state in the animals. Before recommending the rumen modulator for field use, more feeding trials on a large number of animals are required to establish its efficacy.

KEYWORDS: Rumen modifier, herbal feed additive, methane emissions

FISH DIVERSITY OF GODAVARI RIVER AT PRAVARASANGAM DISTRICT, MAHARASHTRA, INDIA

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ABSTRACT

The present work of fish biodiversity were undertaken during July 2021 to June 2022. This investigation of fish biodiversity in Godavari river at Pravarasangam ,District Ahmednagar ,Ms represented the abundance of about 20species of fishes belonging to eleven different families and eight orders. Amidst of all seen species order Cypriniformes was most preeminance 50 %, followed by order Perciformes (18%) followed by siluriformes (14%), followed by order Characiformes (6.74%). Order Beloniformes, Synbranchiformes, Anabantiformes and Osteogloosiformes constituting 234% of the total species of fishes along with a great quantitative seasonal variation at study area.

KEYWORDS: Diversity, Fishes Godavari, Abundance. Seasonal

EVALUATION OF N AND S NUTRITION ON GROWTH, YIELD AND YIELD ATTRIBUTES OF SAFFLOWER CROP.

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ABSTRACT

The field experiment was conducted in *Rabi* season of 2019-20 and 2020-21 at the research farm of IGAU, Raipur (C.G.) the Experiment intituled "Evaluation of N and S nutrition on nutrient use efficiency and fractions of sulphur using Safflower as a test crop" Chhattisgarh to find out the optimum dose of nitrogen and sulphur in safflower and to evaluate the effect of levels of nitrogen and sulphur on growth, yield, nutrient uptake, fraction of sulphur and nutrient use efficiency of safflower. The experiment was carried out with four nitrogen levels (N0: Control (0 kg N ha⁻¹), N1: 45 kg N ha⁻¹, N2: 90 kg N ha⁻¹ and N3: 135 kg N ha⁻¹) and four sulphur levels (S0: 0 kg S ha⁻¹, S1: 15 kg S ha⁻¹, S2: 30 kg S ha⁻¹ S3:45 kg S ha⁻¹) as sixteen treatment combinations were laid out in randomizedblock design with factorial concept and three replications. The soil under study was clayey in texture, Natural (pH= 7.16) in reaction, non saline (0.21 dS m⁻¹) in nature, medium in organic carbon (5.27 g kg⁻¹), low inavailable nitrogen (205.0 kg N ha⁻¹), low in available phosphorus (11.73 kg P₂O₅ ha⁻¹) and high in available potassium (339.37 kg K₂O ha⁻¹) and medium available sulphur (21.35 kg S ha⁻¹).Soil available nutrients viz., N, P₂O₅, K₂O and S were increased with increase in the nitrogen levels 0 to 135 kg N ha⁻¹ and sulphur levels 0 to 45 kg S ha⁻¹.With respect to nitrogen levels, Growth and Yield attributes viz. plant height, number of branches plant⁻¹,number of capitula plant⁻¹, number of seed capitula⁻¹, seed yield , stover yield, were recorded highest with 135 kg N ha⁻¹ (N3) but at par with 90 kg N ha⁻¹ (N2) and lowest wasfound in control(N0S0)

KEYWORDS: Safflower, Growth, Yield and fertility status

USE OF NUTRACEUTICAL AS A NOVEL APPROACH TO COMBAT
VIRAL DISEASE CAUSING PATHOGEN (*BmNPV*) OF SILKWORM,
BOMBYX MORI, L.

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ABSTRACT

Mulberry leaves fortified with nutraceutical were fed to silkworms (*Bombyx mori*, L.) to evaluate its effect against Grasserie (*BmNPV*) disease of silkworm under temperate climatic conditions of Kashmir. The nutraceutical was used at three different concentrations (2%, 4% and 6%). Observations were recorded from the first day of silkworm rearing and the inoculation with *BmNPV* was done at zero hour of fourth instar. It was observed that nutraceutical at 6 per cent concentration performed better in all the larval parameters under study, larval survival percentage increased by 68.79 per cent, the similar trend was also seen in other parameters. The study has thrown an open way for further increase in the concentration of nutraceutical.

KEYWORDS: mulberry, silkworm, disease.

PERFORMANCE OF MULBERRY GENOTYPES DURING CHAWKI
REARING OF SILKWORM, *BOMBYX MORI* L. (*LEPIDOPTERA*:
BOMBYCIDAE)

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ABSTRACT

Five mulberry genotypes (Ichinose, KNG, Goshorami, Koku-21 and Tr-10) were evaluated for their suitability for chawki rearing of silkworm, *Bombyx mori* L. through chemo and bio-assay. The experiment started by brushing disease free layings of silkworm race APS-8. Chawki worms (I and II instar) were reared on five test mulberry genotypes and late age worms (III, IV and V) on a single mulberry genotype (Goshorami). Standard procedures were followed to estimate the nutritional quality of mulberry leaf of test genotypes. KNG excelled in most of the parameters related to chawki rearing viz., shorter first instar duration (77hrs), shorter second instar duration (73hrs) and maximum second instar larval weight (1.6g/20 larvae) and also had a positive influence on the most of the commercial characteristics of silkworm. The results were further supported by the nutritional superiority of KNG mulberry genotype over other genotypes. The study revealed that KNG may be exploited for chawki rearing of silkworm (*Bombyx mori* L.) followed by Ichinose and Koku-21.

KEYWORDS: Mulberry, silkworm, chawki, rearing.

COMPARISON OF HERITABILITY ESTIMATES OF FIRST LACTATION TRAITS BY DIFFERENT METHODS IN HF X GIR HALF BREED COWS

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ABSTRACT

The performance recorded of 421 HF x Gir halfbred daughters of 48 sires maintained during 1977 to 2015 at Research Cum-Development Project on Cattle, M.P.K.V., Rahuri was used to evaluate sire and cows for first lactation and life time traits and to compare the effectiveness of multiple trait animal models over single trait models. The overall least squares means of age at first calving (AFC), first service period (FSP), first lactation 300 days milk yield (FL300DMY), first lactation total milk yield (FLTMY), first lactation length (FLL), first dry period (FDP) and first calving interval (FCI) were 990.69 ± 6.53 , 130.14 ± 3.19 , 2511.70 ± 37.40 , 2701.77 ± 46.04 , 320.43 ± 3.04 , 88.40 ± 2.58 and 409.17 ± 3.25 days respectively. The effect of period of calving was found to be highly significant on FLTMY, FL300 DMY and AFC and non significant on FLL, FDP, FSP and FCI. However, the effects of season of calving and age at first calving group was found to be non significant on first lactation reproduction and production traits. The effect of sire was found to be significant on FLTMY, FL300DMY and AFC and non significant on FLL, FDP, FSP and FCI. The heritability estimates of FL300DMY, FLTMY, FLL, FDP, AFC, FCI and FSP were 0.19 ± 0.14 , 0.18 ± 0.10 , 0.11 ± 0.10 , 0.12 ± 0.12 , 0.20 ± 0.12 , 0.02 ± 0.11 and 0.02 ± 0.11 , respectively using LSML software. The heritability estimates under two traits models were highest (0.29 ± 0.15) in FL 300 DMY and AFC combination. Under three trait models the heritability estimates highest (0.26 ± 0.12) in FL300DMY, AFC and FLL combination and it was highest in four trait (0.33 ± 0.26) in FL 300 DMY, AFC, FSP and FDP combination. The heritability of all traits except FCI and FSP from mixed model using LSML was moderate in magnitude which indicated these traits are more influenced by additive genetic variability and hence there is more scope for improvement by selection. The low heritability estimate of FCI and FSP trait indicates that it is influenced more by managemental and environmental factors than by genetic factors.

KEYWORDS: Heritability LSML, HF x Gir cattle, WOMBAT

A NEW SPECIES AND FIRST HOST RECORD OF CAMALLANUS, RAILLIET AND HENRY, 1915, IN ALIMENTARY CANAL OF FRESH WATER FISH SCHIZOTHORAX RICHARDSONI FROM POONCH RIVER OF J&K, UT OF INDIA

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ABSTRACT

A new nematode species, *Camallanus schizothoraxi* is described from the intestine of fresh water fish *Schizothorax richardsoni* (Ham.) from Poonch river of J&K UT of India. It seems to be the first host record for parasite belonging to genus *Camallanus* not only from India but also from other South Asian countries as well. The body of the parasite is cylindrical and pointed at both the ends. Mouth is slit-like, buccal capsule comprises of two lateral chitinous valves. **Female** : Body; 9.97 in length and 0.13 in width. **Male** : 8.53 in length and 0.144 in width.

KEYWORD: *Camallanus schizothoraxi* n. sp. Fresh water fish *Schizothorax richardsoni*, Poonch river.

OIL USED IN TREATMENT AGAINST FOUR SELECTED LIGNOLYTIC FUNGI INVADING WOOD

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ABSTRACT

Cultural commodities stored in museums/libraries are made up of wood which is vulnerable to fungal infestation and subsequent deterioration under humid subtropical conditions. Many fungi, particularly the xerophilic ones, have the ability to attack wood which is then degraded and utilized by these microbes. Some fungi merely cause discoloration while others change the physical and chemical properties of these historical objects thus reducing their strength. Fungi that grow on wood and cause their decay are called "Lignolytic Fungi". The control and management of such fungi to reduce their impact on the cultural and historical wooden monuments products is an important issue. The growth of fungal hyphae of four lignolytic fungi (*Aspergillus niger*, *Colletotrichum capsici*, *Fusarium oxysporum*, and *Phoma* spp.) on wood treated with *Eucalyptus* oil (EO) was visually estimated. *Eucalyptus* oil (EO) was applied by the Well Diffusion Method and fungal growth inhibition was measured. In this study, 1200 mg/L was the minimum inhibitory concentration for *Colletotrichum capsici*, *Fusarium oxysporum* and the growth of fungus, *Phoma* spp., and *Aspergillus niger* were invisible at a concentration of 1400 mg/L. The maximum zone of inhibition by fungicide (Fluconazole) was recorded towards *Aspergillus niger*. The maximum zone of inhibition was 15±2.4, 14±2.1, 13±2.1, 12±1.1, for fungal isolate *Aspergillus niger*, *Colletotrichum capsici*, *Fusarium oxysporum*, and *Phoma* spp., respectively. The maximum zone of inhibition by *Eucalyptus* oil was 14±3.1 for *Aspergillus niger* followed by 14±3.1, 13±1.5, 1.2±0.5, and 12±2.2, for *Aspergillus niger*, *Colletotrichum capsici*, *Fusarium oxysporum*, and *Phoma* spp., respectively. The data was significantly different at the level of $p < 0.05$. The chemical constituents of EO were analyzed by GC/MS which referred to the presence of amino acid, protein, lipids such as 1,8 cineole, camphor, camphene, -pinene and -pinene, -fenchone and -eudesmol, phenolic compounds, thymol, carvacrol p-cymene and c-terpinene to complete inhibition against the growth of lignolytic fungi isolated from the wood. These findings support the potential use of EOs for wood protection against lignolytic fungi infestation for surface treatment or fumigation.

KEYWORDS: Lignolytic fungi, Wood, Bio-deterioration, Antifungal activity, *Eucalyptus* oil (EO)

SERICULTURE'S ROLE IN BIODIVERSITY PRESERVATION

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ABSTRACT

Sericulture, which belongs to the small-scale and cottage sector, is an environmentally benign, agriculturally intensive, and commercially appealing economic activity. For thousands of rural residents, sericulture has been a source of traditional income. The current abstract shows how mulberry tree planting will help preserve biodiversity. The loss of biodiversity is a result of a multitude of issues, including industrialization, pollution, erosion, and deforestation. The environment suffers greatly from a loss of biodiversity since it denotes the extinction of species, a fall in the number of species in their natural habitats, or both on a global scale. Biodiversity loss has a negative effect on the ecosystem. In order to obtain sustainable advantages for the current and future generations, biodiversity must be protected, enhanced, and managed. Mulberry trees are crucial for bioremediation, afforestation, carbon sequestration, soil preservation, and ecorestoration, which all contribute to the conservation of biodiversity. Mulberry has a special ability to adapt to any type of soil; due of its deeply entrenched, intricate root system, it can grow on mountains, plains, and valleys, in both rainfed and irrigated settings, as well as in harsh humid and semi-arid environments. Additionally, we can turn waste land into productive land by harvesting mulberries.

KEYWORD: Mulberry, Biodiversity, conservation

EFFECT OF SUPPLEMENTATION OF MINERAL MIXTURE ON THE GROWTH RATE OF PIGS

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ABSTRACT

Feed quality is often a major limiting factor for most smallholder pig farmers in Punjab. In fact, feed costs contribute up to 60% to 70% of the total cost of pig Production. In order to evaluate the effect of supplementation of mineral mixture on the growth rate of pigs, KVK Tarn Taran conducted On-Farm trials (OFT) and Front-line demonstrations (FLD) at six different pig farms of District Tarn Taran, Punjab. Performance of piglets by the supplementation of mineral mixture has attracted the attention of farmers because of higher growth rate in treatment groups over the control group. Body weight of Pigs in group with supplementation of mineral mixture @ 2 kg/100 kg feed was 84.80 kg at six months of age, while Body weight of Pigs in group with supplementation of mineral mixture @ 1.5 times of recommended dose was 91.10 kg at six months of age which is 19.71 % increase over the group which was not supplemented with mineral mixture.

KEYWORDS: Growth, Mineral mixture, Pigs, Supplementation

STUDY ON BEHAVIORAL ASPECTS OF RHESUS MACAQUES IN JASROTA, KATHUA

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ABSTRACT

The present study was conducted to analyze various behavioral and Socio-ecological aspects of Rhesus monkey (*Macaca mulatta*) at different study sites in Jasrota, Kathua. The present work was conducted in two different ecological habitats namely- Kaali Mata Temple and Fort of Jasrota. Other than this, some observations were also made on roadside areas to have an insight into their adaptive nature in different environment. Rhesus are broadly classified into four age-classes: Adult males, Adult females, Juveniles and infants. Adult males are found to be dominant among others members. Adult females show social bonding within a group and take total responsibility of rearing their infants. Juveniles spend their most on social play. Rhesus groups were found to be dominated by an adult male in their day-to-day movement and from their feeding and resting sites. Hence, the dominance hierarchy is a social structure within a group of macaques in which adult males are dominant over others, and are therefore able to claim access to better resources in the form of food, mates, shelter etc. Rhesus perform various kinds of activities but the five main types of activities i.e. feeding, locomotion, social grooming, resting and play were most commonly observed. Daily activity pattern showed that feeding was dominant activity followed by locomotion and grooming. As not much work has been done previously in this region so, the observations made on the Rhesus monkey during present study would go a long way and can offer a helping hand in understanding its socio-ecological and various other behavioral aspects.

KEYWORDS: Rhesus, Juvenile, Grooming, Dominance Socio-ecological etc.

COPPER INDUCED OXIDATIVE STRESS AND ANTIOXIDANT DEFENSE SYSTEM OF SWISS ALBINO MICE

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ABSTRACT

Copper (Cu) is an essential trace element for all living beings. Excess exposure to copper leads to develop malfunctioning of various enzymes and toxicity symptoms in organism. Oxidative stress has been considered as main contributor to Cu toxicity in animals and plants. Our study was aimed to determine the effect of Cu on oxidative stress and antioxidant defense system. Seventy two adult female swiss mice were divided into 4 groups (n=12 each), including control group used for biochemical studies. Malondialdehyde (MDA), Glutathione (GSH and GSSG), Hydrogen peroxide (H₂O₂), protein content, Superoxide dismutase (SOD), Catalase (CAT) and Glutathione peroxidase (GPx) were monitored in liver of copper treated and control mice. MDA and H₂O₂ level were significantly higher in group II, III and IV of treated mice than control. Biochemical analysis revealed that highest defense capacity in terms of higher SOD, CAT and GPx activity leads to develop tolerance against copper in liver tissue of treated mice. It was concluded that excess copper induced oxidative stress in mice.

KEYWORDS: Copper, lipid peroxidation, superoxide dismutase, glutathione, catalase, GSH.

ENGINEERING AGRICULTURE VIA CRISPER-BASED GENOME EDITING

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ABSTRACT

Genome editing, also known as gene editing, is a field of study that aims to alter the genetic makeup of **living** beings. This machinery has the power to add, delete, and "fix" genes as well as carry out other highly focused genomic modifications. Crop plant genome editing is a rapidly evolving technology that enables exceptionally precise introduction of highly targeted alterations into a plant genome. Farmers may continue to satisfy consumer demands for wholesome, reasonably priced food produced in a way that uses less natural resources by utilizing genome editing technology. The development of novel crop varieties that are not just high yielding but also resilient to relevant abiotic stresses like drought, salt, flooding, and biotic stresses like insects and viruses has been a constant goal in the period of climate change. In this review, we focus on the application of CRISPR-Cas 9 technology and its usefulness in enhancing food security. Different genome-edited golden crops, or crops biofortified with carotenoids, have been created using CRISPR-Cas-based technologies to combat vitamin A deficiency. The *Triticum aestivum* Inositol Pentakisphosphate 2-Kinase 1 (TaIPK1) enzyme in the wheat plant is disrupted by the CRISPR-Cas system, which improves zinc accumulation in wheat grains by reducing phytic acid. The first naturally chilly tomato is being using CRISPR technology. Many of the genes needed to manufacture capsaicin, the chemical that gives chilli peppers their heat, are already present in the tomato. The Cavendish banana variety is frequently attacked by a fungus (TR4), but using CRISPR technology, the resilience to fungi has been increased by inhibiting the genes that make it susceptible to them. Furthermore, CRISPR-Cas technology has aided in ideotyping agricultural varieties by swiftly enhancing photosynthetic efficiency and plant design to end poverty and combat malnutrition. Altogether, CRISPR-Cas technology has undoubtedly transformed plant biotechnology and agriculture, and it will bring in a new green revolution to help the world accomplish its objective of zero hunger. Moreover, numerous developing biotechnologies have expanded the fundamental crop research toolkit and synthetic biotechnology through the incorporation of artificial intelligence (AI) and diverse bioinformatics frameworks with the introduction of the CRISPR-based platform. The details are reviewed.

KEYWORDS: CRISPER, Gene editing, Biotechnology

TUBERCULOSIS, CHALLENGES AND STATUS WITH SPECIAL REFERENCE TO JAMMU AND KASHMIR: A WAY FORWARD

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ABSTRACT

Tuberculosis (TB) is one of the most ancient disease of mankind and is one the ten major cause of mortality worldwide particularly in developing countries .It is an infectious disease caused by bacteria *Mycobacterium tuberculosis* . It usually affect the lungs but can also affect other organs of body .Inspite of various measures taken to eliminate the TB by Govt .of India by 2025 .The trend of TB cases and drug resistant cases in India is very disturbing .The article is compiled with the objective to study the present status and challenges in India with special reference to Jammu and Kashmir.

KEY WORDS: Tuberculosis,India,Jammu and Kashmir ,Drug resistant

TOXICOLOGICAL MANIFESTATIONS OF FUNGICIDE, MANCOZEB AND ITS IMPACT ON FISH PRODUCTIVITY

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ABSTRACT

To feed the ever growing population, there has been an increasing trend of utilization of fungicides and pesticides to control pests and other diseases. Fungicide Mancozeb, class of dithiocarbamates, has proven to be effective in control of many fungal plant diseases in potato, tomato, grapevine, citrus, pome fruit, banana, lettuce, onions, wheat, mangoes, peanuts, sugarbeet, etc. Interestingly, there have been various researches conducted on its toxicity in humans, rats, and aquatic organisms. Also, it has been reported to be a potential carcinogen. Mancozeb is considered as a potential neurotoxin, carcinogen, teratogen, reproductive and developmental inhibitor, etc. Though, Mancozeb is insoluble in water and is photolabile, the byproducts like ethylene thiourea and metals like zinc and manganese has been found to be a potential contributor to the toxicity of Mancozeb. Mancozeb has been reported to be toxic for aquatic organisms even in minor concentrations which piqued the attention of researchers to the toxicity of the fungicide, Mancozeb; and also to find alternatives to replace this fungicide by safer alternatives for better productivity of plants and safeguard humans and aquatic life.

KEYWORDS: Mancozeb, fungicides, toxicity, aquatic, carcinogen

AN OVERVIEW OF BENZO[A]PYRENE INDUCED GENOTOXICITY IN FISH.

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ABSTRACT

Polycyclic aromatic hydrocarbons (PAHs) are one of the widely spread environmental toxins produced from pyrolysis and incomplete combustion of organic matters-coal, petrol, gasoline, oil, tobacco and diesel. Benzo[a]pyrene (B[a]P), a potent mutagen and carcinogen is a global organic ecotoxicant. Fishes are considered as sentinel organism to assess the adverse effect of environmental contaminants. The exceeding amount of B[a]P and its metabolites causes DNA damage in aquatic organisms. Genotoxicity is a valuable tool to assess DNA modifications raised by environmental xenobiotics. Constant researches confirm the genotoxic effect of B[a]P in fish, however further studies are required to understand the mechanisms of DNA damage in diverse fish species. Hence, this chapter climaxes inclusive understanding of B[a]P induced genotoxicity in fish.

KEYWORDS: Polycyclic aromatic hydrocarbons; Benzo[a]pyrene; Genotoxicity; DNA damage; Fish.

MERCURIC CHLORIDE INDUCES HEPATO-TOXICITY IN FISHES

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ABSTRACT

Industrialisation and anthropogenic activities have been connected with mercury pollution in the aquatic environment, leading to mercury toxicity in fish and other aquatic organisms. Apoptosis, inflammation, necroptosis, and autophagy have been observed in liver tissue of fishes as a result of mercury toxicity based on methylmercury and mercuric chloride exposure in diet or water respectively, with acute and chronic doses of mercury. Because we know that tissue changes occur in important parts of every organ that play various important roles in the normal physiological activities of fish, it is very important to understand how fish respond to mercury contamination and how this heavy metal element affects their overall health. This book chapter gives a compendious information on major cell death pathways in response to mercury toxicity and their potential use as a mercury contamination indicator in fish.

KEYWORDS: Mercuric chloride, Pollution, Fishes, Apoptosis, Necroptosis, Inflammation, Autophagy

PARAQUAT DICHLORIDE INSTIGATED REPRODUCTIVE STRESS IN FISH

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ABSTRACT

Paraquat dichloride, a non-selective herbicide, is used worldwide for the management of terrestrial weeds and aquatic plants, and through run-off enters the nearby water bodies. Paraquat primarily, enters the body through respiratory tract and causes organ injury in both humans and animals. Fish are sensitive to aquatic pollutants; thus, ascertain the effects of contaminants on the aquatic ecosystem. Upon exposure, paraquat induces oxidative stress, thereby causing cellular toxicity in the vital organs of the body, negatively affecting gonads and embryo development and maturation in some animal species. However, paraquat-instigated impairment in gonadogenesis and reproductive success in fish requires further investigations.

KEYWORDS: Paraquat dichloride; oxidative stress; gonadotoxicity; fish; reproductive impairment.

LARVICIDAL POTENTIAL OF *CITRULLUS COLOCYNTHIS* SEED OIL LOADED GUM ACACIA NANOPARTICLES AGAINST MALARIA VECTOR, *ANOPHELES CULICIFACIES*

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ABSTRACT

The use synthetic pesticides is one of the indispensable means to combat various mosquito borne diseases. However, the repeated use of synthetic pesticides has induced resistance in the vectors and pests along with undesirable impact on the environment. The biodegradability, non-persistent and user's safety are the root cause to prefer plant-derived pesticides to synthetic ones. The plant based pesticides tend to degrade rapidly under the influence of several environmental factors. For the feasible application as pesticides, the plant products are formulated either as liquid or as purely solid. In the present work, *Citrullus colocynthis* seed oil loaded in gum acacia amorphous nanoparticles were prepared and evaluated their bioefficacy against the larvae of malaria vector, *Anopheles culicifacies*. Further, the nanoparticles were characterized according to their morphology, size and encapsulation efficiency. Moreover, the nanoparticles employed as ready to use (RTU) formulation for elucidation of the larvicidal activity of the oil loaded and unloaded nanoparticles suggests its potential applications in controlling mosquito vectors.

KEYWORDS: synthetic pesticides, *Anopheles culicifacies*, morphology

WIDE VARIABILITY IN SEX CHROMOSOMES OF SOME OPHIDIANS FROM UT OF JAMMU AND KASHMIR

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ABSTRACT

Cytogenetic studies were carried out on 11 species of Indian Snakes collected from Jammu region using Air Drying Technique of Gorman *et al* 1979. Among all *E. johni* and *E. conicus* belonging to primitive family Boidae exhibits diploid number, $2n=34$ with undifferentiated sex chromosomes in both male and female. In family Colubridae (an intermediate family) there exist huge variation as far as sex chromosomes are concerned i.e *Ptyas mucosus* has $2n=34$, *Oligodon arnensis* has $2n=44$ with undifferentiated sex chromosomes, *Lycodon arnensis* and *Boiga trigonata* both have $2n=36$ with differentiated sex chromosomes(as per literature) while *Natrix stolata* has $2n=36$ with distinct 'ZW' female. In Family Elapidae *Naja naja naja* has $2n=38$ with undifferentiated sex chromosomes but *Bungarus caeruleus* has $2n=44$ with 'ZW' female having submetacentric 'Z' and largest telocentric 'W' but members of family Viperidae viz. *Vipera russelli* and *Echinis carinatus* both have $2n=36$ with well differentiated 'ZW' where 'W' is smaller and 'Z' larger representing final step in the evolution of sex chromosome

KEYWORDS: Cytogenetics, Boidae, Colubridae, Elapidae and Viperidae

INSECTICIDAL ATTRIBUTE OF PLANT DERIVED ESSENTIAL OILS AGAINST *SITOPHILUS ORYZAE* AND *TRIBOLIUM CASTANEUM*

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ABSTRACT

In the spite of various significant advancements in the agricultural field and food production over the many previous decades, pest control remains a major challenge. The species of phyto-phagous insects can destroy not only the grown crops but also the stored agricultural products. They eat up a considerable amount of stored products and also contaminated the grains with their dead bodies, wings and excreta. The post-harvest losses of food grains in India is an estimate of over 12-16 million metric tons/year which accounts for almost 50,000 crores INR and pest devour about 6.5% of total grains in India. They are responsible for the loss of agricultural production of about 10-40% worldwide. According to the WHO, the world's population is expected to reach up to 10 billion by the year of 2050, in order to feed such a huge population, the growth of agriculture should be parallel with growing population. Due to the continuous harm caused by the synthetic insecticides, there is an urgent need to replace the current methods in use and focus on plant materials. Especially, essential oils as they have insecticidal properties and gaining importance due to its easy availability, biodegradability and least toxicity to the non-target organisms. Hence in the present study, the essential oils of *Callistemon lanceolatus* and *Lantana camera* were isolated through the Clevenger apparatus and tested against two common stored grain pests namely, *Sitophilus oryzae* and *Tribolium castaneum*. According to the results, the LC₅₀ values of *C. lanceolatus* was noted as 88.79 and 99.39 ppm after 72 hours of exposure against *Sitophilus oryzae* and *Tribolium castaneum*, respectively. The LC₅₀ values of *Lantana camera* was 88.06 and 103.30 ppm after 72 hours of exposure against *Sitophilus oryzae* and *Tribolium castaneum*, respectively. Therefore, the present study revealed that both the selected essential oils showed the excellent adulticidal efficacy against both the target organisms.

KEYWORDS: phyto-phagous, agricultural products, synthetic insecticides

POST-INFESTATIONAL CHANGES IN DIFFERENT MULBERRY (*MORUS* SPP.) GENOTYPES IN RESPONSE TO *GLYPHODES PYLOALIS* WALKER

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ABSTRACT

Mulberry leaf, the sole food for silkworm, is prone to various pests and *Glyphodes pyloalis* Walker is considered as its major pest in Jammu and Kashmir. The study was undertaken to screen different mulberry genotypes against the mulberry pyralid, *Glyphodes pyloalis* Walker. Eight mulberry genotypes were screened and classified as susceptible, moderately resistant and resistant. Estimation of different biochemical constituents of mulberry leaves was done following standard procedures and it was found that there was reduction in most of the biochemical constituents in different genotypes. The results revealed that the pest inflicts significant damage to mulberry foliage and efforts for management of this pest must be taken promptly in view of the second commercial silkworm rearing under the temperate climatic conditions of Kashmir.

KEYWORDS: Mulberry, *Glyphodes pyloalis* Walker, infestation, biochemical.

SERICULTURE-A VIABLE OPTION FOR SUSTAINABLE LIVELIHOOD AND EMPLOYMENT GENERATION FOR TRIBAL FARMERS OF GUREZ.

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ABSTRACT

The State of Jammu and Kashmir is well known for the production of quality mulberry silk because of its salubrious temperate climate which is favourable for the bi-voltine silk production. Cocoon production in the State during 2017-18 has been 973 MT and raw silk production as 145 MT. Out of various factors responsible for successful cocoon crop, the contribution of mulberry leaf alone is 38.3 per cent. As such production of quality mulberry foliage is of great importance for sustainability of Sericulture. Leaf quality influences not only the growth and development of silkworm but also the quality and quantity of silk produced.

Among new areas high altitude belts where scope of agricultural crops is limited sericulture activities have the possibility to thrive well and has the potential to improve the economic status of the people of higher altitudes like Gurez and Kargil, where agriculture related avocation and for less and food and livelihood security of the people is at thrive. The horticulture in these areas also has no footing thus people of these areas have either negligible or no source of income through agriculture or allied activities. Mulberry being hardy is not only suitable to agro-climatic conditions of these areas but has the scope to improve the socio-economic status of people through silk cocoon raising for income augmentation.

KEYWORDS: Mulberry, Silkworm, Sustainable, Income, employment

EFFECT OF FEEDING DEWORMER AND MINERAL MIXTURE ON PERFORMANCE OF CROSSBRED DAIRY CATTLE

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ABSTRACT

A field study was conducted at farmer field to find out the effect of dewormer and mineral mixture feeding on productive and reproductive performance of crossbred dairy cows. Thirty lactating animals were selected from two villages of Samastipur of Bihar. All animals divided in to two groups, treatment group (T) was fed one bolus of dewormer (Fenbendazole @ 5mg/kg B.Wt. orally) and commercial mineral mixture @ 60 g/day/cow till 90 days of lactation period whereas other group, Farmer practice (i.e. Control) was kept devoid from dewormer and additional mineral mixture feeding. Feeding practices were similar in both the group except feeding of commercial mineral mixture in treatment group. Feeding of mineral mixture was started from 20 days of their calving till 110 days of lactation. Milk production and estrous sign of both groups were recorded at an interval of 0 days, 60 days and 90 days. The result of study indicated that average daily milk yield was found higher by 13.63% in treatment group as compare to control group and values of average daily milk yield from animals of farmer practice and treatment group were 8.8.lit./ day and 10.0 lit/day, respectively. The first postpartum estrus symptom was observed in 66.6 % animals in treatment group and whereas only 26.6% in farmer practice group. Therefore finding of result suggest that supplementation of mineral mixture and dewormer showed better productive and reproductive performance of crossbred dairy animals.

KEYWORDS: dewormer, mineral mixture, milk yield

POTENTIAL MEDICINAL PLANTS FOR ANTICANCER ACTIVITY

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ABSTRACT

Cancer is a multistep process and is characterized by unregulated proliferation of cells. Usually these cells attack and destroy normal cells, causing an imbalance in them. Body. Cancer is caused due to various factors like consumption of tobacco, coming in contact with the body Chemicals, dietary factors and environmental factors. Traditional medicine for treatment Cancer has many effects on healthy cells. There is also a problematic issue of growth in Tumor resistance to current therapeutic agents. This is why there is a great need to struggle this disease with more effective medicine. Natural products play an important role in the fight against cancer and provide a valuable gateway for the use and investigation of new therapeutic agent. Globally, traditional herbal medicines have played a vital role in health systems, and are used to treat various acute and chronic conditions without or minimal toxic effect. Herbal plants are often used as a natural remedy to cure various health problems including tuberculosis, cancer, diabetes mellitus, heart diseases, wound healing, asthma, pharyngitis, hypertension etc. Plants rich in bioactive phytochemistry compounds such as alkaloids, flavonoids, tannins and polyphenols have been used to cure illnesses because of their various pharmacological properties. Numerous medicinal plants are known to possess anticancer activity. The review mainly summarizes the prominent Indian medicinal plants, their extract and its corresponding pharmacological properties such as anti-microbial, antioxidant, anti-diabetic, and anti-cancer etc. The significance of this review is aimed to provide a detailed and collective scientific evaluation of the key anticancer activity of medicinal plants and its pharmacological action for the possible development of different types of cancer.

KEYWORDS: Cancer, Medicinal plants, Pathophysiology of cancer, Anti-cancer activity of different medicinal plants.

CONSTRAINTS PERCEIVED BY THE DAIRY FARMERS IN ADOPTION OF SCIENTIFIC HEALTH CARE PRACTICES IN WEST CHAMPARAN DISTRICT OF BIHAR

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ABSTRACT

Health care of dairy animals are the most important practice in adoption of scientific dairy farming as in absence of proper health care due to incidence of any disease or outbreak it may cause the direct loss of life of dairy animals which will cause great economic loss for the dairy farmers. It is important to assess the constraints perceived by the farmers in West Champaran district of Bihar so that on the basis of perceptions of the farmers a proper strategies may be adopted by the concerned departments of the government to mitigate the constraints perceived by the dairy farmers. West Champaran district lies in the north-west part of Bihar. Its northern part is surrounded by Nepal state where as the western border is divided by the Gandak river. Cross bred cattle and buffaloes are the dominating milch animals of the district. Dairy farms of the studied areas were not well organized mostly were marginal and landless farmers. Present study was conducted in 6 purposely selected villages of KVK, Narkatiaganj in which total 120 dairy owners were randomly selected. High treatment cost of diseases (75.83%) was the main constraint in all types of farms. Lack of credit (68.33%) ranked 2nd followed by lack of proper education on dairy farming (66.66%), unavailability of labour and high rate of wages (65.00%), lack of veterinary services (58.33%) and unavailability of vaccine (58.33%) ranked 3rd, 4th, 5th and 6th respectively

KEYWORDS: Constraints, Health Care, Dairy Animals and West Champaran

Session – IV

**ALLIED SCIENCES,
ENVIRONMENT,
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INNOVATIONS IN ICT**

IMPACT OF INTEGRATED FARMING SYSTEM ON ECONOMICS OF SMALL AND MARGINAL FARMERS IN ROHTAK DISTRICT

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ABSTRACT

A survey on integrated farming system in Rohtak was conducted by CCSHAU Regional Research Station; Rohtak in 2021. The objective of the survey was to compare the economics of integrated farming system with conventional cropping system. A sample of 25 farm households each of crop alone, crop+ dairy, crop + horticulture, crop + vegetable, Crop + Fishery, Crop + horticulture + vegetables and crop +dairy integrated farming systems were selected for giving proportionate allocation to the available integrated farms in 5 villages. The present study confined to Rohtak district in which five blocks i.e. Kalanaur, Meham, Rohtak, Sampla and Lakhana Majra blocks. In this context 5 farmers from each block of Rohtak district has been selected randomly which have adopted Integrated Farming System. Simpler tabular analysis was done for calculating the economics of various enterprises. Among various IFS components highest BC ratio was recorded with Crop + Vegetable + Horticulture (1.72) followed by Crop+ Dairy (1.67) and Crop + Vegetable (1.63). Lowest B: C was observed in crop + fishery. This is due to lower crop yield in areas where fishery is practiced. A sample of 25 farm households each of crop alone, crop+ dairy, crop + horticulture, crop + vegetable, Crop + Fishery, Crop + horticulture + vegetables and crop +dairy integrated farming systems were selected for giving proportionate allocation to the available integrated farms in 5 villages. The BC ratio of Crop + Vegetable + Horticulture and Crop+ Dairy were 21.98 % and 18.43 % higher than Sole Crop (Paddy-wheat).

KEYWORDS: integrated farming, conventional cropping

AN EFFICIENT SYNTHESIS OF BENZIMIDAZOLE DERIVATIVES USING OXALIC ACID DIHYDRATE AND PROLINE BASED LOW TRANSITION TEMPERATURE MIXTURE

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ABSTRACT

We have disclosed an efficient green protocol, one pot multi-components strategy for the synthesis of 2-amino-4-phenyl-1,4-dihydropyrimido [1,2-a] benzimidazole-3-carbonitrile derivatives from simple precursors like 2-amino benzimidazole, aryl aldehyde and malononitrile in the presence of Low Transition Temperature Mixtures (LTTMs) (Oxalic acid dihydrate: L-Proline) medium to sustain eco-friendly strategy. LTTMs found to be greener, faster, recyclable and efficient catalyst for the synthesis of 2-amino-4-phenyl-1,4-dihydropyrimido [1,2-a] benzimidazole-3-carbonitrile derivatives. Short reaction time, high yield, easy work up procedure and environmentally benign method are the main merits of the present protocol.

KEYWORDS: eco-friendly strategy, green protocol

BIORESOURCE DERIVED POLYMER COMPOSITES FOR ENERGY STORAGE APPLICATIONS: AN APPROACH TOWARDS SUSTAINABLE DEVELOPMENT

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ABSTRACT

Energy storage devices could be able to store more energy while still charging quickly, but they also require high-tech and affordable electrode materials. Thus, it is crucial for the development of these devices to create novel and efficient carbon-based electrode materials using naturally occurring chemical components. In this context, porous carbon electrode materials made from biopolymers have become increasingly popular for energy storage applications because of their widespread accessibility, cost-effectiveness, high porosity, light weight, biodegradable, and environmental friendliness. Additionally, the compositional, structural, and electrochemical characteristics of the carbon structures made from biopolymeric materials are distinct and due to the industrial trend toward more ecologically friendly products and materials during the past ten years, biopolymers made from bioresources have attracted a great deal of attention. Custom biopolymer synthesis techniques can be used to create electrochemical energy storage devices, such as batteries and supercapacitors. Biopolymers still need to be combined with other materials in composites even though their potential uses are limited. This enhances the electrochemical performance of the biologically active compounds as well as their inherent physical features. In this study, we discuss recent developments, including the use of bioresource-derived polymer composites for energy storage devices.

KEYWORDS: biopolymer synthesis techniques, biodegradable, Biopolymers

AN EFFICIENT SYNTHESIS OF BENZIMIDAZOLE DERIVATIVES USING OXALIC ACID DIHYDRATE AND PROLINE BASED LOW TRANSITION TEMPERATURE MIXTURE

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ABSTRACT

We have disclosed an efficient green protocol, one pot multi-components strategy for the synthesis of 2-amino-4-phenyl-1,4-dihydropyrimido [1,2-a] benzimidazole-3-carbonitrile derivatives from simple precursors like 2-amino benzimidazole, aryl aldehyde and malononitrile in the presence of Low Transition Temperature Mixtures (LTTMs) (Oxalic acid dihydrate: L-Proline) medium to sustain eco-friendly strategy. LTTMs found to be greener, faster, recyclable and efficient catalyst for the synthesis of 2-amino-4-phenyl-1,4-dihydropyrimido [1,2-a]benzimidazole-3-carbonitrile derivatives. Short reaction time, high yield, easy work up procedure and environmentally benign method are the main merits of the present protocol.

KEYWORD: multi-components strategy, efficient green protocol

IMPACT OF EROSION CONTROL MODULES ON PHYSICAL ATTRIBUTES OF CLAY LOAM SOIL IN LOWER SHIVALIKS OF DISTRICT KATHUA OF JAMMU

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ABSTRACT

Land degradation and its potential causes on a worldwide basis are challenging the economic and social well being of the present and future generation by declining the productivity of croplands and rangelands (Keno & Suryabhadgavan, 2014). Soil erosion is considered as the main cause of land degradation. Although the problem persisted on the earth for a longer period, it has become severe in recent times due to increased man-environment interactions, Rasool *et al.* (2014). Most people in the developing countries are dependent completely on agriculture for their livelihood, so it has been identified as a major threat to sustainability of agriculture and economy of nations (Gemechu, 2016). A continued maintenance of fertile soil is therefore essential in order to meet the basic human needs. Therefore, different erosion control modules are necessary to implement in these areas to limit the soil loss to a tolerable limit. The different erosion control modules are designed to intercept sediments, reduce runoff velocity and facilitate infiltration of runoff water. Beside this, these also have role in improving different soil physical attributes and nutrient status of the soil. Thus this paper aims to assess the impact of erosion control modules on soil physical attributes.

KEYWORDS: Erosion control modules, bulk density, infiltration rate, maximum water holding capacity

SYNTHESIS, CHARACTERIZATION AND COMPUTATIONAL STUDY OF QUINOLINE AND THIAZOLIDINE DERIVATIVES

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ABSTRACT

A series of Quinoline and Thiazolidine were characterized using elemental analysis (C, H, and N) and spectral (FT-IR, ¹H NMR, ¹³C NMR and GC-MS) data. These compounds were screened for their antibacterial, antifungal and Antimicrobial activity was evaluated against the bacterial strains e.g., Escherichia coli (MTCC 443), Pseudomonas aeruginosa (MTCC 1688), Staphylococcus aureus (MTCC 96), Streptococcus pyogenes (MTCC 442), and the antifungal activity was observed against strains e.g., Candida albicans (MTCC 227), Aspergillus niger (MTCC 282) and Aspergillus clavatus (MTCC 1323). All the synthesized compounds were evaluated for minimum possible energy structure DFT calculation using Gaa and for docking study autodock 4.2.6 is used. Docking study is carried out on selected moieties with proteins to determine the probable regions of maximum possible interactions using forming different types of interaction modes and sites..

KEYWORD: FT-IR , Quinoline, Thiazolidine Derivative Antibacterial activity, Antifungal activity.

SYNTHESIS, CHARACTERIZATION AND SOME APPLICATIONS OF AND TRANSITION METAL- SALBUTAMOL COMPLEXES

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Abstract

Complexes of Transition Metal- Salbutamol complexes are synthesized and characterized by spectral characterization. The synthesized complexes were screened for DNA binding and the results were found to be promising as the complexes were potent to bind with the DNA. The binding constants/(K) value derived from the plot for all the complexes were in the range of 1.0×10^4 - 2.0×10^5 M⁻¹. The data are as promising as that of Cu(II)-Salbutamol (1.86×10^5 M⁻¹) Co(II)-Salbutamol (1.43×10^5 M⁻¹) and Zn(II)-Salbutamol (3.03×10^5 M⁻¹) complexes. The maximum binding was observed for the Zinc(II) Salbutamol complex. These spectral characteristics are consistent with a mode of interaction that involves a stacking interaction between the metal and salbutamol and the base pairs of DNA, which means that the titled complexes can intercalate into the double helix structure of DNA. The obtained results can be used for further DNA interaction studies.

KEYWORDS: Salbutamol, TGA, IR, Transition Metal

CONTRIBUTION OF CHEMISTRY IN SUSTAINABLE AGRICULTURE

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ABSTRACT

The problem of poverty in developing countries increases the demand for more productive and industrialized economics which causes global and environmental pollution and the non sustainable use of natural resources. Environmental pollution threats, ranging from atmospheric pollution in cities, acid rain, deforestation and desertification, the reduction of ozone layer and other signs of climatic changes are broadly overlooked. The idea of sustainable Eco-development was presented for the first time in year 1987 and now a days, Green Chemistry plays an important role in the field of agriculture. In the last few years, for sustainable production of agriculture use of renewable biomass resources increases to generate bio- based food products with low inputs, zero waste, sustainable social values and minimizing environmental impact. Researchers are focused to use bio-based material or use feed stock or raw materials which are renewable e.g agriculture waste product. Biomass used for electricity generation is a growing industry. It started in a robust way with the installation of co-generation heat and electric power systems by burning sugarcane bagasse to produce all energy needed in the process, thus presenting a green alternative to lower the dependence on hydro-power. Utilization of lignocellulose waste from agriculture for the production of biomass based fuel as bio-ethanol ,bio-diesel, bio-hydrogen etc. is a major research field in present scenario. Chemists are emphasizing the research on developing bio-pesticides, bio-fertilizers and bio-catalysts for transforming the agriculture material into high value products and also enhancing their production and protection. Green chemists are trying to help farmers how to tackle with contamination removing pollutants, unwanted chemicals and manage the use of recycled water. There are many ways by which chemistry plays an important role for agriculture sustainability.

KEY WORDS: Agriculture sustainability, Green Chemistry, Bio fuel, Bio- fertilizers.

ADVANCEMENT IN RETAILING, SUPPLY CHAIN INTEGRATIONS, DIGITAL REFORMS & DATA SCIENCES

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ABSTRACT

The business of Retail has been rapidly evolving in the past decades with the boom of internet, mobile technologies and most importantly e-commerce. Supply chain management, being the crux of retail business, has also gone through crucial changes with new business scenarios and more advanced technologies in both algorithm design and computation power. In this review, the focus is on several core components of supply chain management, i.e. vendor management, demand forecasting, inventory management and order fulfillment. The key innovations from both academia and industry and highlight the current trend and future challenges are also discussed. Digital supply chain management. First, the emerging theorization on digital supply chain is introduced and focuses on innovative technologies (big data, cloud computing, internet of things, etc.). Second, the necessity to explore new strategic, organizational and human dimensions of digital supply chain is underlined. Third, the papers included in this special issue addressing digital supply chain issues are shortly presented. Finally, future research direction to academics and practitioners is highlighted The editorial discusses the current developments, challenges and research opportunities in digital supply chain management. First, the emerging theorization on digital supply chain is introduced and focuses on innovative technologies (big data, cloud computing, internet of things, etc.). Second, the necessity to explore new strategic, organizational and human dimensions of digital supply chain is underlined. Third, the papers included in this special issue addressing digital supply chain issues are shortly presented. Finally, future research direction to academics and practitioners is highlighted The editorial discusses the current developments, challenges and research opportunities in digital supply chain management. First, the emerging theorization on digital supply chain is introduced and focuses on innovative technologies (big data, cloud computing, internet of things, etc.). Second, the necessity to explore new strategic, organizational and human dimensions of digital supply chain is underlined. Third, the papers included in this special issue addressing digital supply chain issues are shortly presented. Finally, future research direction to academics and practitioners is highlighted The editorial also discusses the current developments, challenges and research opportunities in digital supply chain management. First, the emerging theorization on digital supply chain is introduced and focuses on innovative technologies (big data, internet of things, etc.). Second, the necessity to explore new strategic, organizational and human dimensions of digital supply chain is underlined.

KEYWORDS: Digital supply chain; innovative technology; performance; strategy

SOLUTION STATE STUDIES ON SOME BINARY METAL COMPLEXES OF SALBUTAMOL

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ABSTRACT

The solution state study of transition metal complexes of Manganese(II), Iron(II), Cobalt(II), Nickel(II), Copper(II) and Zinc(II) with ligand as salbutamol have been studied by using Irving–Rossotti titration method at different ionic strength 0.1 M, 0.2M, 0.3 M and 0.4 M perchloric acid and at different temperatures (298.15, 303.15, 308.15 K) in aqueous medium. The proton ligand stability constant of salbutamol are calculated by Fortran IV programs using PKAS and BEST, and by point-wise and half-integral method. The metal-ligand stability constant values are determined by using computer program BEST and the sequence of the stability for binary complexes with regarding to the metal ions is found as : Mn(II) < Fe(II) < Co(II) < Ni(II) < Cu(II) < Zn(II). The high temperature does not favour the formation of stable complexes. The values of metal-ligand formation constant are decreasing with the increasing in ionic strength for all selected metal-ligand complexes. The thermodynamic parameters ΔG , ΔH , and ΔS are also calculated. Formation constant values and species distribution diagram reveals that ML_2 species is the more stable species formed in this studies. Donor sites on optimized Salbutamol molecule were identified with computational study.

KEYWORDS: stability constants, BEST, thermodynamic parameters, distribution curves

FUTURE FOOD FOR GROWING POPULATION IN DIET AND HEALTH PERSPECTIVE

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ABSTRACT

In the forthcoming years it will be a challenging task to feed ever increasing population due to limited natural resources. Many people in the world are undernourished roughly 1 out of 10 people malnourished on the basis of protein factor. Seaweeds are used for human food from ancient times. Microalgae's nutritive value and per unit area yield is much more than conventional crops. Microalgae are beneficial as a food source because in addition to having a high protein content, also contain valuable nutrients such as Carbohydrates, Vitamin B, C, Omega-3 long-chain polyunsaturated fatty acids (PUFA). Phenolic compounds and Minerals. Microalgae are usually made from single cell can quickly grow and multiply into a large biomass and produce rich nutrients. Algae such as *Porphyra*, *Ulva*, *Chlorella*, *Codium*, *Spirulina*, *Scenedesmus*, *Nostoc* and *Laminaria* are used as food in various forms. It is a tedious task to produce new food products from Microalgae with improved nutritional properties. Fermented food, Seed producing plant having floury endosperm are future food. Fermented foods are rich sources of essential nutrients such as vitamin K2 and several B vitamins. Buckwheat and Ragi have floury endosperm. Quona, Amaranthus, Encephalartos (*E. cafra*) one of the cycads also become the future food with enriched nutritional quality.

KEYWORDS Seaweeds, malnourished, PUFA, tedious etc.

PERFORMANCES EVALUATION OF SUGARCANE GENOTYPES FOR YIELD & YIELD ATTRIBUTING CHARACTERS

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ABSTRACT

Evaluation of various sugarcane genotypes for yield & yield attributing traits was conducted at the experimental area of Sant Kabir College of Agriculture & Research Station, Kawardha (Kabirdham) Chhattisgarh. Twelve early genotypes along with 4 standard checks and twenty four mid late group genotypes along with 4 standard checks of sugarcane were tested Checks *viz.* Co 85004, Co 94008, CoC 671 and CoM 265 and four standards *viz.* Co86032, Co99004, Co 8014 and Co 8636 respectively. These genotypes of sugarcane were evaluated in the completely Randomized block design with three replications for their yield performance and other yield & quality attributing traits. The genotypes of sugarcane were collected from Central Sugarcane Research Station (MPKV), Padegaon (Maharashtra). In early group MS 13081 (116.47 t/ha), was found significantly superior over the best standard COM 265 (103.39 q/ha). However, the genotype MS 13081 exhibited better performance for cane yield also showed satisfactory performance for brix% (20.43) and sucrose % (10.96) while in mid late group of sugarcane genotypes CO 13013 (153.04 t/ha) followed by genotype CO 13009 (150.13 t/ha), CoN 13074 (147.16 t/ha) and CoM 13074 (146.25 t/ha) were found significantly superior over the best standard Co-99004 (113.10 t/ha). Genotypes MS 13081 early group and CO 13013 mid late group exhibited good performance in terms of average cane yield and yield components as compared to the standard checks. Stem height, single cane weight, length of nodes, brix percentage and sucrose percentage were play pivotal role for cane yield.

KEYWORDS: Evaluation, sugarcane, yield traits, quality traits.

FAMILY RESOURCE MANAGEMENT: EFFICIENT UTILIZATION OF RESOURCES FOR ATTAINING THE FAMILY GOALS

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ABSTRACT

Management is a concept which involves planned use of various resources directed towards the achievement of desired ends. In family resource management, a home in which goals (ends) are being attained with some degree of satisfaction may be considered as well managed home where management is practiced in an orderly manner. In the context of the family, Management is the natural outgrowth of human interactions and associations whose ultimate goal is to provide for optimal development of its individual members. The essential thing to consider for resource management is the use of available resources and not just the acquisition of goods, while these goals can be achieved only through the use of resources. Therefore the optimum distribution of resources determines the degree to which any family is actually striving towards a particular aim. Families should gear their process of management towards achievement of short and long term goals and enhance the satisfaction of the family members. Resources are classified into two categories (1) Human and (2) Non-human. Human Resources refer to those qualities and attributes which an individual possess. To call him resourceful, it is referred, in terms of occupational status, skills, education, knowledge, attitude, energy and time. Non-human also known as material resources are tangible resources which are available to us for use, but are not part of us. They are easily identified, limited in their available and essential for the achievement of most goals. Management process consists of five steps a) Planning b) Organizing c) Directing. d) Controlling e) Evaluating. Management of resources process are really a series of decisions, based upon our previous experiences occurs when there is some problem to solve, some choice to make based upon our previous experiences. Therefore, decision making is the heart of the management and are a course of action consciously chosen from the available alternatives for the purpose of desired result.

KEYWORDS: Planning, Organizing, Directing, Controlling, Evaluating.

DISTRIBUTION OF MICRONUTRIENT CATIONS (ZN, CU, FE AND MN) AMONG DIFFERENT LAND USE SYSTEMS UNDER DISTINCT SOIL ORDERS IN MALWA REGION OF PUNJAB IN NORTH-WESTERN INDIA

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ABSTRACT

The lack of availability of micronutrients is a significant barrier to soil stability, sustainability, and productivity. Punjab's agricultural output has also increased significantly, exacerbating micronutrient deficiencies in the soil and plants. In the Malwa region of Punjab, research was done to examine the variation of the micronutrient cations zinc (Zn), iron (Fe), manganese (Mn), and copper (Cu) in relation to different land use systems, such as agriculture, horticulture, and forestry, which fall under the three dominant soil orders (Entisol, Inceptisol, and Aridisol). The distribution of DTPA-extractable micronutrients in soil profiles was found to be significantly influenced by soil orders and land use systems. Among the various soil orders, Inceptisols had the highest Zn content, followed by Entisols, and Aridisols had the lowest. Entisols had the highest levels of DTPA-extractable Fe, Mn, and Cu, followed by Inceptisols, and Aridisols had the lowest levels. When compared to agriculture land use systems, forest and horticulture land use systems had higher micronutrient content. Organic carbon content has a significant positive impact on micronutrient availability. The surface soil horizon had higher micronutrient content than the subsurface soil horizons, which could be attributed to a faster rate of organic matter addition and decomposition, resulting in more nutrients being released into the soils. It was suggested that the information gained from this study could be effectively applied to the management of micronutrient cations in order to maintain the fertility and overall productivity of various soil types.

KEYWORDS: Soil orders, Entisol, Inceptisol, Aridisol, micronutrients, land use systems, agriculture, horticulture and forestry

MUSHROOM PRODUCTION IN THE WORLD: AN OVERVIEW

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ABSTRACT

Presently, six mushrooms viz., *Agaricus bisporus*, *Lentinula edodes*, *Auricularia* spp, *Pleurotus* spp, *Flammulina velutipes* and *Volvariella volvacea* contribute about 90% of the world mushroom production. According to FAOSTAT mushroom production has increased from 0.5 million tonne (MT) in 1961 to 10.24 MT by 2017. According to various others the mushroom production has increased from 0.17 MT in 1960 to 34.8 MT in 2013 and is likely to be over 40 MT at present. The FAOSTAT does not cover all the mushrooms. For example, by comparing data of FAO and Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan we can see that FAOSTAT data for Japan represents only fresh shiitake production reported by MAFF which is less than 1/4th of the mushroom production in Japan. In 1978 mushroom production in China was 0.06 million tonnes which is less than one third of current mushroom production in India. But the comparison ends there as in last four decades there has been 600 times increase in mushroom production. China is producing 3/4th of world's mushrooms (about 35.7 million tonnes in 2016) providing jobs to 20 million of its people. The production of cultivated mushrooms in Japan has increased by over 14 times from 1960 when production was 32.9 million kg to 469 million kg in 2011 and the production in 2016 was 455 million kg in 2016. In USA, about 98% of the mushroom production is accounted for by button mushroom. The mushroom production in 2019-20 was 361.22 million kg. The production is stagnating or rather declining since last few years. The production in the year 2015-16 was 416.86 million kg. In Canada, the mushroom production in the last ten years has been increasing but at very slow rate. The total mushroom production in Canada in 2019 was 132.11 million kg. The mushroom production by Europe (EU) was 1291.85 million tonnes in 2017. Netherland and Poland put together account for about 50 % the button mushroom production in the EU. The Australian mushroom industry is dominated by the white button mushroom, *Agaricus bisporus* which makes up about 98 per cent of domestic mushroom production. Production has expanded from 6,000 tonnes in the mid-1970s to over 60,000 tonnes by 2010 to over 70,000 tonnes in 2018. Productivity of Australian mushroom growers has about doubled in the last twenty years from average yields of 18 kg of mushrooms per square meter to 35 kg for the more efficient growers.

KEYWORDS: mushroom production, *Agaricus bisporus*, EU

ROLE OF MUSHROOM TECHNOLOGY IN SOCIOECONOMIC UPLIFTMENT OF SOCIETY

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ABSTRACT

Mushroom technology is a green technology with immense potential for community participation. Hence this technology can be successfully taken up as a social enterprise not only by public but also by the private sector and the non-Government organizations. Mushroom enterprise is a social enterprise which work on different aspects and impact the society through increased community participation through innovative ideas to solve local problems, creation of jobs and training opportunities especially for women and youth in rural areas and enhancing greater economic activity between the communities and linkage with market. Mushroom technology is a befitting technology to be undertaken as a social enterprise as it encompasses: agro-residue recycling for betterment of environment and decreasing carbon foot print, creation of employment in rural sector, women friendly technology, technology for production of highly nutritive vegetable to mitigate malnutrition through its inclusion in nutrition programs and inclusive technology for especially abled people. India being an agrarian country, produces more than 500 million tons (Mt) of crop residues annually. Although crop residues are variously used yet according to one estimate about 91-141Mt of different crop residues are surplus and not used at all. These surplus crop residues are either burnt or ploughed back in the field. Cereal crop accounts for 58% of the unused surplus residues followed by fiber crops (23%) in addition to 2% from sugarcane, 3% from pulses, 6% from oilseed crops and 6% from other crops. Even if 10% of these crop residues are diverted to mushroom cultivation; it can lead to immense economic activity. Mushroom technology is an indoor activity and gives a better working environment. Mushroom being short duration crop can show the fruit of their labor quickly and further motivate them. If a proper market linkage is created through social enterprise, it will lead to the creation of especially abled entrepreneurs who can take up spawn production, mushroom cultivation, mushroom processing, mushroom value addition, Ready to fruit (RTF) bag production, mushroom culinary activities as standalone modules under one umbrella of a social enterprise. When taken in this format it can be very useful in the rehabilitation programs of disabled soldiers, destitute women etc.

KEYWORDS: Ready to fruit (RTF), women friendly technology, social enterprise

MUSHROOM PRODUCTION IN INDIA: CURRENT STATUS AND FUTURE NEEDS

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ABSTRACT

India was a late starter in mushroom production and there were very limited units in 60s. Many commercial units came up in different parts of the country for production of button mushroom based on the technical knowhow from outside. Only some of these could succeed. Even the largest unit Agro Dutch mushroom unit in Lalru, Punjab, that had a production capacity of about 50,000 tonnes per annum, got closed down in 2010-11 or so. In the last decade there is spurt of mushroom units in all parts of the country, most of which are focusing on production of button mushroom. About ten percent of button mushroom is contributed by seasonal growers. In India, mainly four types of mushroom, viz., button, oyster, paddy straw and milky mushroom are cultivated. Button mushroom accounts for 3/4th of the total mushroom production in the country. Presently India is producing 201000 ton of mushroom and is ranked fifth in the total mushroom production. Food and Agriculture Organization Corporate Statistical Database (FAOSTAT), however, does not match with the figures collected by Directorate of Mushroom Research and as per FAOSTAT, production in India in 2017 was 98246 tonnes. If India has to catch up with the increasing demand for mushrooms from domestic and international markets, the educated youth must be promoted to undertake the mushroom entrepreneurship in a larger scale. Mushroom cultivation requires better understanding of technical aspects related to insulation, air conditioning, air flow, control of humidity, temperature, carbon dioxide, hygiene, etc. and also the production of quality spawn. The road to success in mushroom cultivation is in understanding and following the good cultivation practices in totality as mistake at any one stage renders the whole mushroom unit a loss making one. There is need for better training set up in the country as the research institutes are not fully equipped and mandated to train people across the country. The institutions at lower level are not competent to provide answers to all the issues involved in commercial mushroom cultivation. In fact, we lack the machinery, technical know and proper consultancy services. All new units require trained manpower. But we do not have any mechanism in the country where we train people in quality compost production, cultivation or processing both technically and professionally through on farm trainings. We also need to educate people about the nutritional benefits of mushrooms. There is need for better interaction of policy makers, scientists, marketers and mushroom growers for a uniform policy to promote this unique venture.

KEYWORDS: mushroom growers, domestic and international markets

MUSHROOM ENTERPRISE: A GOOD OPTION FOR AGRICULTURE ENTREPRENEURSHIP

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ABSTRACT

Mushroom production has tremendous potential as an income generating activity. Mushroom is important not only from nutritional and medicinal point of view but for income generation and export also. It requires little space or land and hence it is of great importance for landless and marginal land holders. It grows independent of sunlight, feed on organic matter and does not require fertile soil. In addition to floor, air space is also utilized resulting in higher productivity. Mushroom cultivation can provide additional income to farmers who wish to take up this activity especially in their lean season. The greatest advantage of this venture is the fact that mushrooms have capacity to convert nutritionally valueless substance like wheat or paddy straw in the nutritious delicacies. It also enables recycling of agro wastes like dung and chicken manure which otherwise are posing pollution problems. Entrepreneurial skills are required if growers intend their cultivation activities to go beyond subsistence and local trade, and wish to develop a small business. These may include basic book keeping skills, planning and administration, management supplies of materials, management and coordination of packaging and transport, and negotiation skills and marketing. In the present scenario, the unemployment problem, malnutrition burden, low-income sources, low input cost, eco-friendly adaptable technology for unemployed youths, scheduled caste and scheduled tribes / weaker section and rural women are key points for mushroom production demand. Mushroom cultivation is another source for self-employment of unemployed youth and college drop outs, poor, small and marginal farmers, farmwomen, landless laborers, and even retired or in-service personnel. Trade in cultivated mushrooms can provide a readily available and important source of cash income for men and women and the old, infirm and disabled alike. Certain parts of the mushroom cultivation process, such as filling substrates in containers and harvesting, packaging are ideally suited for women's participation. Several programmes have enhanced women's empowerments through mushroom production by giving them the opportunity to gain farming skills, financial independence and self-respect.

KEYWORD: Mushroom production, book keeping skills, Entrepreneurial skills

VISION 2047: INDIA – THE ROADMAP TO BECOMING A DEVELOPED COUNTRY

Pradhnyal Kulkarni, Shounak Joshi, Shubham Chavan

ABSTRACT

This paper explores India’s vision for 2047, which aims to make the nation more industrialized and less dependent on imports. The ultimate objective of vision 2047 is to make India a developed country. The world of the coming decades will seek to attain a road map to wholistic progress via the vision of innovators and creative conceptualizers rather than focused specialists operating within their silos (TOI/ Updated: Aug 15). It will become increasingly important to initialize collaboration by connecting various parts of the whole world (Chatterjee, 2015).

The review will comprise three major themes. The first section will elaborate on the various areas that vision 2047 seeks to foster, advancements, and innovations in technology, governance, commerce, industry, infrastructure, urban landscape, and security and defence. The second part will elaborate on sustainable industrialization across the nation with robust infrastructure and advancement in Retailing, Supply Chain integrations, Digital Reforms, and Data Sciences. Finally, we will explore how various sectors of our economy will improve with the applications of Digital Technology, Cloud Computing, AI, AR & VR. In doing so, we hope this research will bring forth valuable information that will foster the realization of a developed India by 2047.

The paper hints towards the steps that need to be taken by India as a country to transition from its current state of developing country to a developed country with the help of the initiatives like Atmanirbhar Bharat, Digital India, and many such positive and bold initiatives which will be established on the pillars of SC integration and Digital reforms (Sarthak, 2022).

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EFFECT OF GLOBAL WARMING ON OUR FAUNA

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ABSTRACT

Global warming is a gradual increase in the earth's temperature generally due to the greenhouse effect caused by increased levels of carbon dioxide, CFCs, and other pollutants. The key impact of global warming on wildlife is habitat disruption, in which ecosystems places where animals have spent millions of years adapting rapidly transform in response to climate change, reducing their ability to fulfill the species' needs. Habitat disruptions are often due to changes in temperature and water availability, which affect the native vegetation and the animals that feed on it. According to a paper published in Springer Nature, global warming in the coming decades will result in the habitat decline of the Indian brown mongoose in the Western Ghats. The habitat of this "temperature and altitude-dependent" small mammal could contract by anywhere between 20% (4,764 sq km) and 55.78% (13,233 sq km). The Snow Leopard's high-altitude habitat is especially vulnerable to the effects of climate change. These animals spend most of their time above the tree line of the Himalayas, in the alpine grasslands. With global warming, the tree line in this region is likely to move significantly higher in the coming decades, shrinking and fragmenting the snow leopard habitat. Climate change also makes these alpine grasslands more vulnerable to degradation, leading to a drastic reduction in prey and depleting the leopard's primary sources of food. In the near future, Forrest et al. (2012) estimate that snow leopard habitat in the Himalayas could be reduced by 30%, resulting in the loss of alpine grasslands important for both snow leopards and their prey.

Another impact of the rising temperature is the rapid evolution of wild species leading to mutation and loss of genetic variations. Genetic variations are important for survival since they are linked to adaptation. According to BBC, this inability to adapt will lead to the extinction of polar bears within a century as the Arctic warms up and signs are showing up already. Migration is another phenomenon that is important for the survival of wild animals, especially birds. Birds migrate to find better conditions for breeding and food. Siberian cranes used to migrate to Keoladeo National Park but due to the inhabitable condition of Bharatpur Lake, their number has decreased. Now, they have become endangered species. Another most terrifying impact of climate change is the behavioral changes that are observed in wild animals. For instance, seagulls are showing the signs of auto-cannibalism where they feed on their own eggs which reduce their hatching rate. There have also been numerous cases of wild animals encroaching upon the human territories outside their habitat which was previously not seen. These changes in the behavior, migration and genetics are in turn affecting the normal life of animals and thus of the whole ecosystem. Global warming may be a familiar term by now; serious attention is needed to mitigate the impact of global warming on our fauna It is high time we realize that humanity cannot exist in isolation. To save wildlife is to save humanity after all.

KEY WORDS: Global warming, habitat disruption, behavioral change, Migration

EFFECT OF GLOBAL WARMING ON OUR HEALTH

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ABSTRACT

Climate change, together with other natural and human-made health stressors, influences human health and disease in numerous ways. Some existing health threats will intensify and new health threats will emerge. Not everyone is equally at risk. Important considerations include age, economic resources, and location. The global climate is the connected system of sun, earth and oceans, wind, rain and snow, forests, deserts and savannas, and everything people do, too. Effects of climate change include higher temperatures, increases in precipitation patterns, rising sea levels, weather-related natural disasters, increased drought and decreased food security. The annual global temperature, or Earth's average surface temperature, has increased 1.4 degrees Fahrenheit (0.8 degrees Celsius) since the 1880s. Two-thirds of that increase has occurred since 1975. Over 36 million kilotons of CO₂ were emitted in 2014. Emissions in 2018 are projected to increase by 2.7 percent compared to a 1.6 percent rise in 2017 — emission rates had not increased in three years. Heat stress can make working conditions unbearable and increase the risk of cardiovascular, respiratory and renal diseases. Additionally, it is estimated that 22.5 million people are displaced annually by climate or weather-related disasters, and these figures are expected to increase in the future. Climate-induced human mobility has a socioeconomic cost and can affect mental and physical health.

KEYWORDS: Climate, Human health, Physical Health, Emission.

STUDY ON THE KNOWLEDGE OF VARIOUS SERICULTURE TECHNOLOGIES AT FARMER'S LEVEL IN TEHSIL PATTAN OF DISTRICT BARAMULLA

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ABSTRACT

In the present study, 120 sample respondents were selected randomly from 7 sericulture beats of Pattan zone in district Baramulla. The study revealed that majority (71.25%) of silkworm rearers belonged to middle age group of 35-60 years and (62.50%) were illiterate having no education. Majority (72.75%) of silkworm rearers had medium family size (6-9 members) and (73.55%) of silkworm rearers had sericulture +Agriculture as their main occupation. 56.25% of silkworm rearers had low exposure to sources of information and (62.45%) had medium scientific orientation. The major findings revealed that (62.73%) of silkworm rearers had low level of knowledge, (36.24%) had medium level of knowledge and only 1.03% had high level of knowledge about sericulture technologies. (47.75%) of the respondents belonged to medium adoption level category, (44.9%) had low and (7.35%) of the respondents had high adoption level of improved sericulture technologies. Independent variables such as age, education, occupation and scientific orientation exhibited positive and significant correlation with extent of adoption. The knowledge of technology was found to have greater impact on improving the productivity and production in terms of agriculture as well as its allied activities.

KEYWORDS: Knowledge, Adoption level, Silkworm Rearers, Improved technologies, Respondents

ARSENIC TOXICITY, ABSORPTION BY PLANTS AND PHYTOREMEDIATION TECHNOLOGY: AN OVERVIEW

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ABSTRACT

Arsenic pollution is growing slowly in major parts of India which may risk to environment and human health. Because arsenic source is natural but now days its release in environment increases due to anthropogenic activities. We cannot stop release of arsenic in the in the environment but can reduce its effect in nature. To deal with this problem researcher develop many technologies but among them phytoremediation is cost effective, ecofriendly and mostly accepted technology. This short review is explaining about the arsenic and its distribution in nature, different remediation methods including phytoremediation with their advantages and disadvantages, arsenic uptake by plants, xylem loading and phloem loading unloading, arsenic effect on plants and their defence system.

KEYWORDS: Arsenic, biogeochemical cycle, phytoremediation, detoxification, remediation, xylem, phloem, oxidative stress, ROS (reactive oxygen species), hyperaccumulation, biomarkers.

DEFLUORIDATION OF GROUNDWATER EMPLOYING NAGFANI [*OPUNTIA DILLEN*]

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ABSTRACT

Drinking water with excessive concentration of fluoride causes fluorosis which progresses gradually and becomes a crippling malady in the long run. It affects young, old, poor, rich, rural, and urban population. It has attained a very alarming dimension. The state has extreme climatic and geographical condition. Rajasthan suffers both the problems of quantity and quality of water. In most part of the state groundwater is either saline or having high nitrates and fluoride content. Obviously, groundwater is the major source of drinking water and over 94% of the drinking water demand is met by groundwater. Excess fluoride concentration in drinking water has deleterious effects on human health. All the districts in Rajasthan are engulfed by the clutches of fluorosis, to a varying degree. There being no perennial surface source for drinking water, the state is dependent chiefly on groundwater and its level is deeper year-by-year due to over exploitation. As the water table is receding more and more water sources are becoming prone to higher fluoride concentration. The pattern and prevalence of fluorosis in human population are determined by a number of epidemiological factors like water chemistry, demographic and nutritional profile of the community and high mean annual temperature of the area. Adsorbent prepared from *Opuntia dilleni* is employed to defluoridate contaminated water in the present investigation.

KEYWORDS: F-ion, Dental Fluosis, Clinical manifestations, Preventive measures, Mitigations strategies, Nutritional prophylaxis; 1.5ppm

DEFLUORIDATION GROUNDWATER EMPLOYING NANOTECHNOLOGICAL APPROACH

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ABSTRACT

One in eight persons in the world lack access to safe water. The need to provide safe potable water to poor people in developing countries cannot be overemphasized. Nanotechnology has the potential to deliver affordable and effective solutions for water purification, providing access to safe potable water to millions of people. This will contribute to poverty alleviation and achievement of the Millennium Development Goals (MDGs). Nanotechnology has introduced a new generation of water filters and purification systems. Research nano catalysts like silver, iron, titanium dioxide and carbon nano-filtration membranes for water treatment applications is a fast growing field. Nanotechnologies can provide solutions to alleviate water problems, both in terms of detection and removal of contaminants. Also since small amounts of nanomaterial are used for purification, costs and waste generation are low, providing an effective and affordable water treatment solution to the poor. Many water sources are contaminated with both biological and chemical pollutants such as arsenic, fluoride, etc. Fluorine is one of the elements of halogens and exists abundantly in crust, especially in some organics and stones. Fluoride deficiency may cause dental caries and excessive use of its standard may cause dental disease, liver and skeletal fluorosis. Fluorosis can cause weakness of dental and skeletal structure and stagnate the growth. Optimal fluoride content is within the range of 0.5–1.0 mg/L. Nanotechnology, the engineering and art of manipulating matter at the nanoscale (1–100 nm), offers the potential of novel nanomaterials for treatment of surface water, groundwater, and wastewater contaminated by toxic metal ions, organic and inorganic solutes and microorganisms. Due to their unique activity toward recalcitrant contaminants and application flexibility, many nanomaterials are under active research and development. Accordingly, literature about current research on different nanomaterials (nanostructured catalytic membranes, nanosorbents, nanocatalysts, and bioactive nanoparticles) and their application in water treatment, purification and disinfection is reviewed in this article. Moreover, knowledge regarding toxicological effects of engineered nanomaterials on humans and the environment is presented. The aim of this review is to investigate fluoride removal efficiency of nanotechnology with a concentration exceeding the permitted value.

KEYWORDS: Fluorosis; Nanocatalyst; Desorption; CaCO_3 ; CaO ; $\text{Ca}_3(\text{PO}_4)_2$; Defluoridation; Membrane separation

DETRIMENTAL INDOOR AIR POLLUTION: ITS SOURCES, INFLUENCE ON HEALTH AND EXTENUATION PROGRESSIONS

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ABSTRACT

Most of the research around the world has been pursued on outdoor air pollution, but in India we have a more severe problem of Indoor Air Pollution (IAP) which means the degradation of indoor air quality by harmful chemicals and other materials; it can be up to 10x worse than outdoor air pollution. This is because contained areas enable potential pollutants to build up more than open spaces. Statistics suggest that in developing countries, health impacts of indoor air pollution far outweigh those of outdoor air pollution. The foremost factor cited for is burning of fossil fuels for cooking. Among the 70% of the country's rural population, about 80% households rely on biomass fuel making India to top the list of countries with largest population lacking access to cleaner fuel for cooking. 4 million deaths and 5% disability-adjusted life-years is an upshot of exposure to IAP from unhealthy cooking making it globally the most critical environmental risk factor. India alone bears the highest burden (28% needless deaths) among developing countries. Moreover, about ¼ of ambient PM_{2.5} in the country comes from household cook fuels. As there are no specific norms for IAP in India, urgent need has arisen for implementing the strategies to create public awareness. Moreover improvement in ventilation and modification in the pattern of fuel will also contribute to eradicate this national health issue. These considerations have prompted the discussion of the present knowledge on the disastrous health effects of pollutants emitted by biomass combustion in India. Additionally, Particulate Matter as an indoor air pollutant is highlighted with main focus on its spatial temporal variation and some recent Indian studies are further explored.

KEYWORDS: IAQ, IAP, Biomass fuel, Particulate matter, Cook stove initiatives, Exposure determinants

VIBGYOR: FROM SKY TO EARTH

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ABSTRACT

The rainbow is an amalgamation of seven colours which are seen in a precise sequence. These colours are **VIBGYOR** - violet, indigo, blue, green, yellow, orange, and red. The presence of these seven colours is also seen in almost all forms of nature. This relation is still not studied by our scientific fraternity worldwide. Only one colour from rainbow – “Red” trapping by chlorophyll of green plants is known, while other six colours trapping is still a question. Our group is in process of this study, and we converted thoughts in our first book- Tint: Unlock **VIBGYOR** (published by Kindle-AMAZON) and registered as copyright (4660/2022-CO/L, Indian patent office, New Delhi). We have concluded our thoughts as- 1. Colours was being trapped by pant kingdom, passed in animal kingdom, and flowed from biotic to abiotic. 2. Colors neither be created nor destroyed, it passes from one form to other. 3. There was genetic, and metro -geological evolution took place for color development in flora-Fauna(living)and nonliving component of our biosphere.

KEY WORDS: rainbow, **VIBGYOR**, copyright, seven colours

Session – V

**TEXTILE, FASHION,
FOOTWEAR, RETAIL,
YOGA, HUMANITIES,
SOCIAL SCIENCES &
MANAGEMENT**

DESIGN OPTIMIZATION OF 3D PRINTED FASHION ACCESSORIES USING FUSED DEPOSITION MODELING

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ABSTRACT

Additive manufacturing (AM) is process of layer-by-layer addition of material to fabricate complex geometry, multi materials and tailored mass production. It has eliminated the use of dies to fabricate plastic products as done in injection moulding process. Strength to weight ratio is an important factor to be considered to save the material and simultaneously maintain the required mechanical properties to meet the functional requirements. In this paper, various geometrical structures i.e triangular, rectangular and hexagonal interlocks of polylactic acid (PLA) material were designed in bulk density of 10% and 15 % of fashion accessory using computer aided designing. Using finite element analysis, the mechanical properties such as tensile strength, flexural strength and strain energy were analyzed along with the factor of safety. Various geometric structures were 3 D printed and experimentally analyzed for the mechanical properties. The results show that among the geometrical structure at both bulk densities, hexagonal interlocks have significant tensile strength and flexural strength. In future, several combinations of geometrical structures may be explored to identify the required mechanical properties.

KEYWORDS: additive; manufacturing; geometry; tensile; strength

TEXTILE CRAFTS OF HIMANCHAL PRADESH: A RELIABLE MEANS OF SUSTAINABLE DEVELOPMENT

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ABSTRACT

India has always been known throughout the world for its incredible textile heritage since the earliest civilization. Indian cotton chintz from coromandel coast, embroidered textiles from Gujrat, shawls of Kashmir, Satgaon quilts from Bengal, Patola, block printed and painted textiles, Red Madras Handkerchief were some prominently exported textiles to various regions of Europe, Indonesia, Egypt and Africa. At present the government has realized the importance of its traditional heritage thereby undertaking various initiatives to protect and promote the traditional crafts of India. Considering Atma Nirbhar Bharat mission, the sustainable development of craft sector and its practitioners becomes indispensable for the secured future of these craft communities. In this regard, in this paper a light has been thrown to textile crafts of Himanchal Pradesh like Kullu weaving, Kinnauri weaving etc and how these crafts have contributed in generating the livelihood for the unemployed women and men alike. Himanchal Pradesh having high altitude supports the rearing of animals like sheep, yak, rabbit, shahtoosh etc, thereby facilitating the weavers the easy access to the locally available sheep wool, Yak wool and rabbit hair etc. That has enabled the weavers and NGOs to produce handlooms of premium quality which garners a very good exchange value. Various efforts carried out by NIFT Kangra in documenting these crafts and reviving these crafts under Craft cluster policy have been reported.

KEYWORDS: Kinnauri weaving, Kullu weaving, Craft cluster, handlooms, traditional crafts

THE MULTI FUNCTIONAL AND LOW-COST FOOTWEAR FOR MILLENNIAL WOMEN:
FORESIGHTS FOR FASHION AND TECHNOLOGY

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ABSTRACT

The aim of this research is to design and develop a multifunctional female footwear at economical cost that will be beneficial for millennial, where style and aesthetic look of the footwear can be easily changed. The study is also associated to give maximum comfort to the females by giving an option to reduce heel size in footwear as per their discretion. In this research, a pair of upper with variation in colour and styles is design and developed in the form of removable upper. Variations of removable upper are designed in such away, so that a user can have different choices of shoe, matching with shade of apparel she wears. Research is also based on studying and developing a mechanism constructed to detach and attach different heels in a shoe. Tich buttons were used along the feather edge of the footwear which provides the mechanism of detachable upper. This development may be the solution for millennials, who wants varieties in their shoe style frequently. It also focuses on reducing the carbon foot print, becomes more socially and economical product. In this paper Foot anatomy, types of ladies' heels and other aspects related to it are minutely observed. Data was collected from the millennials, that includes the students of various colleges and working women. It also covers the taste and preferences of women and provides comfort, variety, budget, durability and personality. Various national and international veterans are also consulted during the research.

KEYWORDS: Foot anatomy, comfort, variety, budget, durability and personality

THE PERSPECTIVES OF INDIAN EDUCATION SYSTEM: A CASE STUDY- OF PRIMARY
EDUCATION SYSTEM IN AHMEDNAGAR DISTRICT, MS

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ABSTRACT

The present works deals with study of Primary education system from Ahmednagar District in state Maharashtra. In Maharashtra the Modern education system really needs radical changes in it. Mahatma Fule's views still proves right. It was his demand that primary education should be free and compulsory the district Ahmednagr is important district in Maharashtra, India. It comprises 14 tehsils. Each tehsil with Primary, Secondary and higher education system. The teachers should be encouraged to work in hilly and tribal areas. The primary education should be strengthened by providing basic life education in the primary schools. Primary classrooms should be well equipped. So that the attitude of upper classes about primary schools will be changed. The government should see that all these things are done effectively and nobody would be deprived of primary education. This is in the interest of society as well as of nation's development.

KEYWORDS : Primary, Remedies, Percolation, education, Knowledge

PHYSICAL PROPERTIES OF CORE SPUN YARNS OF FLAX, LYOCELL AND SPANDEX FIBERS

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ABSTRACT

Linen is the oldest known fabric to human kind. The inevitable change in climate and lifestyle created a new face of linen which is affordable, easy to care and comfortable. For the purpose of imparting all aforementioned properties, flax fibers (fibers from which linen fabrics are made) are cottonised i.e. they are cut in to smaller length so that they can be blended with other fibers. In the present study, lyocell fibers were blended with flax fibers because of their sustainable nature whereafter yarns were developed using the core spinning technique. Further, ring spinning frame was selected to develop these yarns as it is the most commonly used spinning frame with an ability to produce a wide range of yarn counts and also have an advantage of simple structure and economical production. Four types of yarns were developed, first yarn having sheath of lyocell yarn and core of 20D spandex yarn, second yarn having sheath of lyocell yarn and core of 40D spandex yarn, third yarn have sheath of flax lyocell and core of lyocell yarn, fourth yarn having sheath of flax lyocell and core of 20D spandex yarn. These developed yarns were tested for various properties viz. yarn count, twist per inch, tenacity, breaking force, elongation, unevenness and total imperfection. Statistical analysis showed significant difference between the properties of all four yarns.

KEYWORDS: Linen, Lyocell, Spandex, Core spun yarns

INNOVATIVE PRODUCT DESIGN FOR LIP-GLOSS

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ABSTRACT

Lip gloss is a cosmetic product that is applied to the lips to give them a glossy shine and sometimes to add a slight colour. It is available as a fluid or a soft solid. The product is offered in a variety of opacities ranging from translucent to solid, as well as frosted, sparkly, glossy, and metallic finishes. Users face a common problem with the use of lip gloss bottles in the brush type variation: contamination of the transparent lip gloss in the bottle after use over lipstick. This leads to an irreversible colour change of the lip gloss fluid. This unpleasant situation can sometimes also manifest itself in the remains of lipstick forming small bubbles in the bottle, which can ruin the product consistency. The research aims at solving this problem through improvement and innovation in the existing product design of the lip gloss brush bottle variation. Based on rigorous primary and secondary research in the user-centric area, consumer behaviour, and the design process, the solution articulation is as follows: An addition of a makeup remover bottle attached to the lip gloss bottle through the mechanism of magnetism with suitable and industry-level ergonomics like material used, measurements, smart mechanisms, user handling, etc. The proposed solution will enable the users to use the product more efficiently and without contamination from the lipstick, thus enhancing the consumer experience. Since the two bottles are connected through magnets, they can be separated and carried individually if space is an issue for carrying them in small purses.

KEYWORDS: lip gloss, anti-contamination, product design improvement, magnetism, makeup remover

SOCIO-ECONOMIC TRANSFORMATION THROUGH CUSTOM HIRING CENTRES AMONG
FARMING COMMUNITY OF HARYANA – A SOCIOLOGICAL APPRAISAL

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ABSTRACT

Custom Hiring Centres of agricultural machinery and implements are very helpful for the farming community to increase the net income of the farmers by way of reducing the cost of cultivation at each and every stage of crop growth in a timely manner. On socio-economic perspective, the different farm implements such as transplanter, multi crop thresher, combine harvester and baler had been bought by the custom hiring centre owners as additional equipment on need based through the income generation by operating the custom hiring centres. Further, it has been noted that custom hiring centres play an important role in water conservation strategies, developmental, sustainability and environmental issues. The study was conducted in wet and dry agro-climatic zones of Haryana on sixty custom hiring centres. It was found that overwhelming majority of the farmers (87.67%) increased the size of contractual landholding after the adoption of custom hiring centres. Majority of the farmers were also saving the seeds, fertilizers and pesticides. As per study, the farmers (61.67%) were also facing the problem of the high cost of farm implements followed by lack of service and maintenance support for machinery (56.67%) and non-availability of machines at peak times in the *rabi* and *kharif* seasons (50.00%). It was also suggested that people should be encouraged to adopt custom hiring centres and reduce the production cost.

KEYWORDS: Nature and extent, socio-economic impact, socio-economic factors, and constraints

CREATING AWARENESS OF TEXTILE RECYCLING

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ABSTRACT

Humans have three basic needs: food, shelter, clothing, or textiles. However, we ignore to look at the effects it is having on the environment and people's health. We just read that the production of textiles in the modern world produces a huge amount of waste but this is untrue. Waste is created not just during textile manufacture but also during textile use. And to address the issue, the textile sector has implemented various initiatives to reduce its harmful impact on the environment. One such measure is textile recycling- the reuse as well as the reproduction of fibers from textile waste. It can be done through thermal, material, chemical, and mechanical processes. Textile recycling is beneficial for environmental and economic condition in terms of, reducing demand for textile chemicals, the requirement for landfill space is reduced, consumption of less energy, and reducing water wastage. Efforts are needed to increase consumer awareness and encourage manufacturers to increase the use of recycled textile waste in new products. In this paper an attempt has been made to provide readers with a general understanding of the many waste products generated in the spinning, weaving, knitting, and garment manufacturing sectors of the textile industry as well as the waste products that can be recycled to create products with added value. In fact, various techniques that exist for using this waste to create new, high- quality goods from raw materials has been discussed.

KEYWORDS: Fibers, Recycling, textile, and waste

APPLICATION OF NATURAL DYES AND RESIST MATERIAL IN BATIK

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ABSTRACT

Natural dyes were mostly used in dyeing of natural fibres such as cotton, jute, wool, silk etc long time back, thereafter chemical dyes became very popular. However natural dyes still survived through traditional artisans who were spread in various parts of the world. Now the world has started realizing the harmful effects of uncontrolled use of chemical dyes and resist materials on human beings and pollution of environment. The world has started looking for ecofriendly dyes and resist materials, natural dyes are one good option. Natural Dyes biggest USP is its Eco Friendly nature. Further Consumers also realise the benefits of natural products for better life, better future and health living and prefer such products. Batik fabric is traditionally done using wax as a resist. Designs can be created by painting or stamping resist material like Flour, Gums and resins which is exude from tree trunks of specific trees and collected in sticky form. We can thus do away with the use of Paraffin/ bee wax, and then dyeing it using natural colours. The Flour/ glue stop the dye from penetrating the fabric. Thus one can create an effect similar to batik much more easily by using natural glue, corn flour instead of hot wax. As also dye the fabrics using natural colours derived from turmeric, beetroot etc. Application and usage of natural dyes in textile sector can fulfil to achieve the goal of sustainability for our future ahead.

KEYWORDS: Batik, Natural Dyes, sustainable, fashion, eco-friendly

DESIGN OPTIMIZATION IN THE OPENING OF HIP FLASK

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ABSTRACT

Hip flask is a product which enables us to carry any alcohol of our choice conveniently wherever we go. The existing designs of hip flasks does not allow it's users to pour in the beverage of their choice without the use of a funnel as the mouth of the hip flask is very narrow and since it's a hassle for the users to carry a funnel along with their flask, the new design with a tapered opening would be introduced. The new design would be wide enough to allow the users to pour in alcohol without having to use a funnel. Moreover, a chain would be attached from the cap of the flask to its body so that the user doesn't lose the cap. The closing mechanism would be a screw on as seen in traditional hip flasks and hence, it'll be leak proof. The shape of the head will remain the same, which would allow the users to drink from the hip flask with ease and not have difficulty to adjust to a newer design. Further in this product more geometrical designs can be explored.

KEYWORDS: Taper; opening; chain; geometry

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ABSTRACT

A wrist watch is a product basically used for having a record of time by wearing it on wrist. Straps or chain are attached with the dial to make it wearable and create a similar kind of accessory like a bracelet. Different types of materials are used for making the straps of the watch but most of the commonly used material are leather and metal. This product is one of the most useful and commonly used one but brings along some of the demerits. The metal pin attached to the dial which is used for correcting or changing the time hurts or poke the wrist of the user which makes it uncomfortable and quite irritable. Even sometimes it becomes a task to open the pin for time correction as it gets tight and pulling it outwards gets difficult. This problem can be solved just by adding a small mechanism between two metal pins. By placing a metal pin in a horizontal way which is directly connected to the inner mechanism of the watch and the other one in vertical way through which the user can change or correct the time. These two pins will be connected by gears which are placed at the end of each pin transferring the vertical movement into horizontal movement that when cause the change inside the mechanism of the watch. This will bring ease in the usage of wrist watch as the method of pulling the pin outward is changed to pulling it outwards and then upward. The face of the pin will be placed of the top side of the dial. This will make the product much easier to use and comfortable. The future scope of this product is quite upright as the anthropometry was acknowledged while adding features in the product and can be further carried out in such aspect.

KEYWORDS: rotation; motion; metal; pin

A STUDY OF SIGNIFICANT FACTORS DETERMINING STUDENTS' SATISFACTION IN PROFESSIONAL PROGRAMS WITH SPECIAL REFERENCE TO BUSINESS MANAGEMENT IN HARYANA

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ABSTRACT

The current economic environment, the decline in government funding, entry of private players, establishment of new institutions, increase in competition and internationalization of education has transformed higher education institutions into business organizations that are competing for resources and students. Recognizing this, most of the higher education institutions are trying hard to achieve quality and it has become the most significant goal for them. However, in present time of competition students' satisfaction and students' perception of institutional services must be prioritized by higher education institutions. The present study attempts to examine the effect of perceived service quality dimensions on student satisfaction in the context of higher education. Data will be collected from students of business management of state and private universities of Haryana, A self-administered modified questionnaire will be used to collect primary data. Partial Least Square Structural Equation Modeling technique will be used to examine relationships between service quality dimensions (functional quality, image and technical quality) and perceived satisfaction of students towards higher education

KEYWORDS: Higher education, Perceived Service Quality, Student Satisfaction, Functional Quality

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ABSTRACT

The aim of this paper is to utilize different waste materials in order to make upcycling shoes. With the fast fashion pace, the demand unexpectedly increased for Natural fiber-based materials. And at the same time, there are a lot of Waste clothes and natural Fiber-based materials that are being discarded by consumers every year. For the sake of the environment, and sustainability it is necessary for the fashion industry to use the existing available materials such as clothes or denim. These discarded materials can also be put into use for making uppers of shoes, and soles. This paper illustrated the design & product development process of Natural Fiber based Upcycled footwear. This paper proposed the use of Discarded natural fiber-based waste materials in the making of shoe parts. These shoe parts will be assembled together to make complete Upcycled Footwear. Without any rectifications, these materials are being used as an upper for the final product of the shoe. Process of the Manufacturing these shoes is simple and can be made manually as well as with minimal use of machinery. A further actual paper pattern is needed for sizing, fitting, and attaching the upper with the correct size sole. Footwear A & Footwear B are developed using the illustrated process. This research adopted a simple shoe-making process with the lowest workforce and capital invested. The shoes are more economical and durable available in the market. The purpose of the study is to search and innovate the surrounding waste fabric material and make Upcycled sustainable footwear products the at lowest cost for the better use of mankind.

KEYWORDS: Upcycling, Natural fiber, Footwear, rectification, segmentation, and sizing.

AN AUTOMATIC SYSTEM TO SIMPLIFY PATTERN MAKING FOR GARMENTS.

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ABSTRACT

A foundation, or a pattern used as the basis for any garment, is created by obtaining measurements from a person or a model. Drafting or draping processes are followed for the development of the pattern. The basic pattern is made following the taking of the measurements, which then is altered according to the size and type of garment. But there are problems like improper balancing, wrong proportion and incorrect alteration while drafting patterns from the basic measurements. Due to these problems, there arise fit issues in the garments. Further, the development of a pattern is multi steps process. These steps are followed for the development of a pattern for each type of garment. This research has been undertaken to simplify the pattern making process and build a system where even complicated garments can be made with ease. The proposed automatic pattern making system will automatically create a grading pattern using the basic size pattern, grading values for the grade points, and an alteration rule. After that adjustment, it will uniquely create tailored patterns to be used. Secondary research has been undertaken on the current systems available in the market that provide automatic pattern making. Systems like TukaAPM and Gerber's Acumark for made to measure provides automatic pattern making facilities for basic garments. The garments made by the proposed system will fit better compared to garments made using the traditional tailored approach. The traditional garments patterns with more complications can be made using the system very easily and smoothly. The proposed system will revolutionise the pattern making process by simplifying and eliminating steps. Tailors and boutiques can utilise this system to develop a pattern for haute couture and ethnic dresses.

KEYWORDS: 2D patterns; CAD System; Design analysis; Custom clothing, Automation

CRADLE TO CRADLE: DEVELOPING AND INCORPORATING OF WHOLE SYSTEM THINKING FOR SUSTAINABLE DEVELOPMENT (TEXTILES & FOOTWEAR)

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ABSTRACT

This paper addresses the role of design professionals and technocrats to innovate methods for sustainable development by considering & understanding the concept of whole system thinking. Cradle to cradle is an approach to consider the whole system thinking practices to have better sustainability for future generation. There is a need to shift from being product orientated perspective to whole system thinking approach. To develop circular system design methods & practices, need to understand the whole production processes, products, consumers, logistics, market and its impact on environment. This paper aims to consider & design approaches to understand the user's needs and related environmental issues. By understanding whole system we can define the problems in system, as everything is interconnected. Lifecycle thinking (circular system) approach will provide solution to solve the challenges. We have to redesign the business models and develop new circular business model innovations for better sustainability practice. To develop better approaches for cradle to cradle, we need to understand the whole system thinking process and incorporating in a right manner to solve the challenges for sustainable & circular business. Cradle to cradle approach can be implemented by understanding the biomimetic & circular system models to find solution for social, business and environmental challenges. To develop new generation of designers & innovator, academic participation through research in whole system thinking module training envisage the solutions for sustainable development. This paper focuses on how C2C criteria can be practically incorporated to design & develop business models at sites for social, economic and ecological sustainability for future generations.

KEYWORDS: whole system thinking, design, fashion textiles, sustainability, circular economy, innovation

INDIAN BANKING SYSTEM

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ABSTRACT

Indian banking is one of the oldest forms of banking that existed in India from the mediaeval period until the first half of the nineteenth century. The indigenous banking system is a monetary system in which local entities function as bankers by offering financial services such as loans and accepting deposits. It entails a private form and an individual performing fundamental banking operations such as accepting public deposits and lending money. Prior to the arrival of foreign banks and commercial banks, it was the only type of banking available in India. This further collapsed after the emergence of cooperative and commercial banks in the late 1990s. The financial system of India is dominated by nationalized banks. The banking industry's success is undoubtedly more directly tied to the economy than any other sector. The objective of this paper is to examine all private loans and money transactions made up to the nineteenth century i.e. indigenous banking and weigh their benefits and drawbacks.

KEYWORDS: Indigenous Banks, Banking System, Security, Hundis

OPTIMIZING REVOLUTION DEVELOPMENT OF SUSTAINABLE GLIDE SHOE IN BIODEGRADABILITY STUDY IN COMPOST ENVIRONMENT

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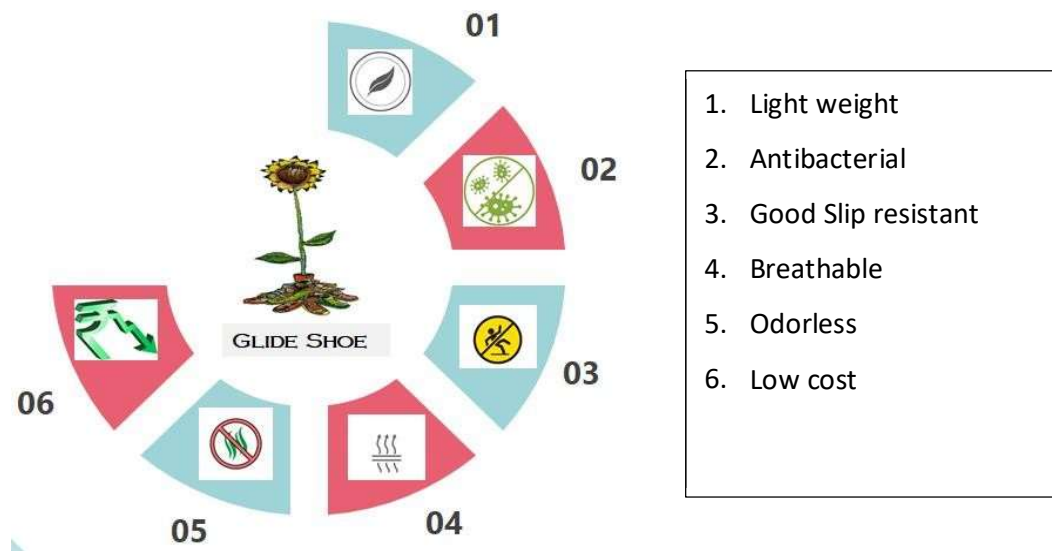
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ABSTRACT

The past few decades have been declared as the best time period for human empowerment and inventions. Along with countless technological and scientific discoveries, mankind is flourishing with unimaginable power. All these are enough to make a person think “is this really happening?” But what’s the catch? Newton’s third law states that every action has an equaling and opposite reaction. Hence what are the opposite reaction to all these new discoveries and inventions? One simple word to explain would be environmental degradation. This single term contains thousands of problems to which man hasn’t even found or thought of coming up with answers. When it comes to the industry of footwear, the materials and components used also play a major role in polluting the earth. For example, highly used materials like leather, PVC, PU, EVA, and TPR are extremely polluting and take a long time to degrade. Materials like this greatly affect the natural ecosystem which starts a chain of unfortunate events which eventually ends in irreversible damages to the environment. Another stressing problem is the waste management system of footwear materials. Disposal of these materials are extremely hard and requires a lot of money. Is this really the cost we can afford to pay? What can be done to undo these? Is there really a solution here? This is where this project GLIDE SHOES comes in. We are focused on manufacturing a shoe which is completely made of organic and easily degradable materials without diminishing the quality of it.

KEYWORDS: PVC, PU, EVA, and TPR



Future Salient Outcome

AN AUTOMATIC SYSTEM TO SIMPLIFY PATTERN MAKING FOR GARMENTS

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ABSTARCT

A foundation, or a pattern used as the basis for any garment, is created by obtaining measurements from a person or a model. Drafting or draping processes are followed for the development of the pattern. The basic pattern is made following the taking of the measurements, which then is altered according to the size and type of garment. But there are problems like improper balancing, wrong proportion and incorrect alteration while drafting patterns from the basic measurements. Due to these problems, there arise fit issues in the garments. Further, the development of a pattern is multi steps process. These steps are followed for the development of a pattern for each type of garment. This research has been undertaken to simplify the pattern making process and build a system where even complicated garments can be made with ease. The proposed automatic pattern making system will automatically create a grading pattern using the basic size pattern, grading values for the grade points, and an alteration rule. After that adjustment, it will uniquely create tailored patterns to be used. Secondary research has been undertaken on the current systems available in the market that provide automatic pattern making. Systems like TukaAPM and Gerber's Acumark for made to measure provides automatic pattern making facilities for basic garments. The garments made by the proposed system will fit better compared to garments made using the traditional tailored approach. The traditional garments patterns with more complications can be made using the system very easily and smoothly. The proposed system will revolutionise the pattern making process by simplifying and eliminating steps. Tailors and boutiques can utilise this system to develop a pattern for haute couture and ethnic dresses.

KEYWORDS: 2D patterns; CAD System; Design analysis; Custom clothing, Automation

DESIGNING OF FLARED *KHADI KURTIES* USING CAD WITH DIFFERENT CONSTRUCTIONAL FEATURES

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ABSTRACT

Most Indian females particularly those of the younger generation, choose *kurties* to wear with a variety of lower garments that include jeans, skirt, palazzo, lehnga and salwar *etc.* Young females have a great crush for *kurties* as these are easy to wear, comfortable and create a traditional and fashionable look. A large variety of *kurties* with different colours, sizes, designs and styles are available in the market. However, *Shri Gandhi Aashram* also offers *kurties*. But these *kurties* have very limited designs. Whereas, consumer demands variety in these *kurties*. Therefore, in most cases, consumers do not prefer to buy old-fashioned *kurties* available at *Shri Gandhi Aashram*. Thus, this study was planned with the objective *i.e.*, designing of flared *khadi kurties* using CAD. In the present study, a survey method was used for data collection related to the preference of consumers for readymade *khadi kurties* with constructional features. The study was conducted in the premises of Govind Ballabh Pant University of Agriculture and Technology (GBPUA&T), Pantnagar located in the U. S. Nagar district of Uttarakhand state, India. A total of one hundred females between 21-31 years of age were selected as the sample for the present study. Based on the results of the survey, by using CAD (Jindex Software) with different constructional features, total sixteen flared *khadi kurties* designs were developed and all designs were evaluated by consumers. Collected data were analyzed by using frequency, percentage and Weighted Mean Score. It can be concluded from the study that all prepared designs for flared *khadi kurties* using CAD (Jindex Software) with constructional features were accepted by all the consumers.

KEYWORDS: khadi kurties, khadi kurties designing, constructional features in kurties, CAD designing

CORRELATION OF AWARENESS AND PRACTICES OF SCHOOL GOING GIRLS TOWARDS SELF-DEFENSE

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ABSTRACT

Self-defense training in today's competitive world has taken very important place to protect the female girls from any violence occurring to them. In today's situation teenage girls going into streets without any safety measures is one of the risk factors in society. Teenage girls getting abused not only by men but also by their own people it can be of their same gender. The present study was undertaken with the aim to assess the correlation between awareness and practices regarding self-defense of school going girls of Udaipur, Rajasthan. Purposive sampling method was used to select the samples from four government schools within the municipal limits of Udaipur city, having the similar infrastructural facilities. Standardized self-structured questionnaire was used to find out the awareness regarding self-defense of school going girls. The findings of the study indicated that, among the three aspects of awareness i.e., physical aspect, psycho-social aspect and economic aspect, there was a significant correlation found between physical awareness and practices regarding self-defense of school going girls. In line with the result of the present study, Hollander (2014) and Senn *et al.*, 2015 found that self-defense training not only improves women's ability to resist assault, it also reduces the initiation of assaults against women, suggesting that women who have been trained in empowerment-based self-defense are able to avoid or forestall attacks before they begin. The persistent mischaracterization of women's self-defense as being only the use of physical tactics in an assault situation is an important reason why self-defense is often dismissed as a prevention strategy.

KEY WORDS: Self-defense, Awareness, Practices, Physical aspect, Psycho-social aspect, Economic aspect

RECYCLING OF INDUSTRIAL WASTE INTO USEFUL MATERIAL

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ABSTRACT

The need for effective apparel waste management is motivated by the increasing cost and decreasing availability of landfill space and the diminishing of resources in nature. The biggest issue faced by the apparel industry today is how to dispose the fabric waste in a useful manner. Today, sustainability and conservation being so important to firms and consumers alike, the well-established practice of knitting recycling lends itself well to eco-friendly business practices. The aim of the study is to identify the waste which is disposed from knitwear industry. The data was collected through secondary research and analysis of previous studies. They highlighted various ways of how recycling of knitted garments can be done, why is it beneficial and how it can be used after recycling. Easy and affordable methods are being used. The garment can be sorted in colours, then passed through shredding machines after removing trims and then workers bundle the fibres by hand which are ready to be spun into yarns. A few international brands are working on the process of strengthening the used fabric yarns by mixing plastic bottle waste to make them more durable. The method is both contributing to sustainability as well as decrease in the waste production. Thus, the research points out the fact that knitted products have a long span, therefore, they can have endless uses after recycling. The study thus concludes by highlighting the methods for profitable recycling of knitted garments. Making use of recycled

fabrics will help in reducing the speed of their depletion. Thus, the research talks about the key methods, uses and the benefits obtained after practicing recycling including increase in employment rate, growth in economic cycle and decrease in waste. Therefore, recycling can be a new set of solution to overcome the problem of industrial waste.

KEYWORDS: Recycling, sustainability, Knitted Garments, waste material

COMPUTER AIDED DESIGNING OF HAND-WOVEN MANIPURI *PHANEK* WITH *PHULKARI* EMBROIDERY FOR SUSTAINABILITY OF THE CRAFTS

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ABSTRACT

India is a diverse country which has a wide range of traditional arts and crafts which are under threat of extinction due to the normalities of the modern world. The study was an attempt to combine the two traditional crafts from two different states of India. For this Computer Aided Designing was carried out to design the hand-woven Manipuri *phanek*, a traditional costume worn by Meitei women of Manipur using *phulkari*, the traditional hand embroidery of Punjab. The traditional ten *phaneks* along with their cultural significance were documented and fifteen *phulkari* motifs were randomly selected from various primary and secondary sources. Ten *phaneks* designs were developed using different motifs and placements in COREL DRAW X8. For each design three different colour combinations were developed. Thus, the designs having the highest weighted mean score for design placement and highest modal frequency for colour combination were selected through preferences given by a panel of ten judges. Five most preferred designs were selected and were embroidered on the *phaneks* with *phulkari* embroidery. The prepared *phaneks* were given codes P1, P2, P3, P4 and P5. Various parameters like suitability of combination of motifs, colour combination, workmanship of embroidery and overall appearance were used for taking the consumer acceptance from eighty female respondents i.e. 40 from Punjab and 40 from Manipur. The consumers preferred *phanek* P1 for suitability of combination of motifs, *phanek* P2 for colour combination and *phanek* P3 for uniqueness of design, workmanship of embroidery and overall appearance. *Phanek* P1 was the most preferred from the respondents of both the states of Punjab and Manipur. Cost evaluation was done by adding thirty percent profit to cost price and selling price was calculated. Majority of the respondents found the selling price as appropriate. Hence, *phulkari* embroidered *phaneks* hold a good commercial potential and admired by the proposed consumers which can be of a great help in the sustainability of these traditional crafts.

KEYWORDS: phulkari, embroidery, phanek, motif, traditional

MITHILA PAINTING PARTICIPANTS FROM RURAL AREAS GET SOCIAL EMPOWERMENT

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ABSTRACT

Empowerment is the ability to gain control of one's life and make decisions for oneself. It increases confidence, self-esteem, happiness, and control over one's own life. In the world of today where individualism and Global civilization has become a threat to national identity, micro cultures will survive only if cultural pluralism is retained. The protection and nourishment of folk arts is the means to it. Indian society is undergoing an acute culture crisis, which is reflected by the traditional community organizations being suppressed under severe moral, social and economic pressure. The handicrafts of Bihar are appreciated all over the world because of their great aesthetic value and their adherence to tradition. Mithila painting is more than an art. Through this creative ability, a group of women express their desires, dreams, expectations, hopes and aspirations to the people. Mithila painting, is also known as Madhubani painting. Madhubani painting is an emblematic expression of day-to-day experiences and beliefs. Traditional artisan skills exist in clusters and are unique to Bihar. This research was carried out in the Bihar district of Madhubani to investigate the social empowerment of women involved in Mithila painting. For this purpose, sixty respondents who were involved in Mithila painting were purposively chosen. The study's findings revealed that among the studied variables such as Age, Cast, Occupation, Family annual income, Family type, Entrepreneurial orientation, Risk orientation, and Source of information utilized, the majority (60.3%) of the respondents become socially empowered those women who are involved in Mithila painting. One of the social variables examined was education, which was discovered to be a significant contributor to women's social empowerment.

KEYWORDS- Women Empowerment, Social Empowerment, Mithila painting.

A STUDY OF ANALYSING RELATION BETWEEN STORE LOYALTY PROGRAMS AND CUSTOMER LOYALTY CREATED THROUGH STRUCTURAL EQUATION MODELING WITH SPECIAL REFERENCE TO AMAZON ONLINE STORE

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ABSTRACT

Loyal customers are the real asset of any retail store that may lead to sustainable business. Every store tends to enlarge its loyal customer base. Loyalty programs are very effective medium to attract the customers and make them associated with the business. Retailers often run loyalty programs like Cash back, discounts, bonus points, and premium customer club programs etc. In order to get benefitted from the loyalty scheme, customers keep on repetitive purchases from the same store. Here, it is important to analyse whether loyalty programs are rightly making the impact among the customers. Store managers put many efforts on planning, implementation and management of loyalty programs. Analysing the effectiveness of loyalty programs is important for achieving the goals. Problem Statement taken for this study is to know whether loyalty programs are working in right directions and these are effective enough to attract the customers and create a large base of loyal customers. Objective of this study is to know the effectiveness of loyalty programs run by Amazon store and to know the relation between loyalty programs and factors responsible for making loyal customers for amazon online store. Study shall be done to analyse the relation between loyalty schemes and actual factors influencing for loyal customers. Several independent variables shall be identified to determine the effectiveness of loyalty schemes. Similarly several sub factors shall be identified to determine the responsible factors contributing in creating actual loyal customers. Consequently Factor analysis and Sequential Equation Modelling method is used to determine the relationship.

KEY WORDS: Customer satisfaction, Factors of Customer Loyalty, Loyalty Programs,

FALCONERIA INSIGNIS: A NOVEL PLANT SOURCE FOR SUSTAINABLE FINISH ON
MUSEUM TEXTILE ANTIQUITIES

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ABSTRACT

Museum textiles are very fragile in nature because they are age old. These antiquities are exposed to many environmental factors such as temperature, relative humidity, dirt, dust and many more. Therefore, the researcher carried out this study to conserve our past heritage so that this will serve as an inspiration for the future generations. According to the survey of 30 museums of India in the present study, conservators used to keep neem leaves, black pepper and clove in the showcases. But all such materials leave stain on textiles as well as these are edible sources therefore the researcher dig out the new novel source that can overcome all the previously occurring problems. *Falconeria insignis* is a monoecious deciduous tree that grows to a height of 15 meters. A thorough assessment of the literature on the plant under consideration revealed that there are no widely published studies on the phytochemical analysis of "*Falconeria insignis*" anywhere in the globe. As a result, the current study was designed to look into the potential chemical components by first planning the plant extract of *Falconeria insignis*. The leaves of the plant material were collected, prepare and extracted for plant extract. The phytochemical analysis i.e., Qualitative and quantitative screening of phytochemicals was carried out. The plant extract was also tested for its antimicrobial activity. *Falconeria insignis* leaves showed total phenolic content in methanol (247.18 ± 0.127 mg/g) and acetone (154.02 ± 0.085 mg/g) followed by distilled water (138.9 ± 0.096 mg/g), hexane (48.67 ± 0.196 mg/g) and dichloromethane (41.23 ± 0.114 mg/g). *Falconeria insignis* leaves extract recorded total flavonoid content in methanol (41.82 ± 0.074 mg/g) and acetone (35.29 ± 0.114 mg/g) followed by distilled water (20.09 ± 0.032 mg/g), hexane (15.77 ± 0.132 mg/g) and dichloromethane (15.77 ± 0.132 mg/g). Total tannin content in methanol (14.43 ± 0.113 mg/g) and distilled water (12.33 ± 0.117 mg/g) followed by acetone (11.81 ± 0.181 mg/g), dichloromethane (9.15 ± 0.115 mg/g) and hexane (6.77 ± 0.139 mg/g). Antimicrobial activity of plant extracts increased with the increase in concentration of extract because in more concentration a greater number of phytochemicals were present therefore the plant extract exhibit higher zone of inhibition as the concentration of plant extract increases.

KEYWORDS- *Falconeria insignis*, Phytochemical Analysis, Total Phenolic Content, Total Flavonoid content, Total Tannin Content, Antimicrobial Activity

PROJECT STUDY ON EMPLOYMENT GENERATION THROUGH MAKE IN INDIA IN
FOOTWEAR AND ALLIED MANUFACTURING SECTOR

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ABSTRACT

Since India's population is growing very fast and has been facing a serious problem with employment generation. "Make in India" campaign aims at transforming India into a global manufacturing hub and thus generate enough employment. However, the current status of the footwear manufacturing sector presents several deterrents in making Make in India a success. In the past, the absorption capacity of the footwear sector has shown a declining trend, which creates lot of questions in mind about the achievability of the aims of the campaign. In such a case exclusive focus on the large-scale footwear manufacturing facility can do some miracles. The paper argues that identifying appropriate manufacturing facilities and services that can create enough employment and usher in growth is a better strategy. Along with this identification Skilling and educating India has become imperative, to make the workforce ready for productive employment opportunities for Future.

KEYWORDS: Make in India, Skill India, Footwear Manufacturing, Low-Productivity Sectors

**"TO ANALYSE BARRIERS TO THE ADOPTION OF ONLINE SHOPPING
FOR LOW INVOLVEMENT PRODUCTS BY INDIAN CONSUMERS."**

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ABSTRACT

Online grocery shopping is the most convenient mode of shopping groceries and it involves less involvement of consumers. The best part is now the consumers don't have to go to their desktops and laptops with the evolution of smart phones it becomes even easier for the consumers to scroll, select and pay for what they like. According to Kofloor the "*consumers want anything quicker, cheaper and better*". But there are concerns whether it is suitable for purchasing all kinds of groceries or not", due to increasing issues over the internet there is a lack of trust amongst customers.

A study of the barriers that affects the attitude of consumers to shop online is important for the e-commerce companies to make better strategy by understand changing consumer behavior. When the era of e-commerce started many companies who were the pioneer failed as they failed to understand the attitude and requirements of the potential consumers.

Problem Statement taken for this study is to know whether: 1) Future of online retailers (offering low involvement products) to match needs and demands of customers.2) What factors are significant to increase the adoption of online grocery? 3) What stops (barriers) the consumer to go for online shopping?

Primary data will be collected through Questionnaire technique.

The questions are related to 1) Personal details of the respondent to understand the demography. 2.) Knowledge of online shopping especially low involvement products. 3)Respondent's willingness to shop online in future and their reservations (what stops them) for online shopping.

Factor analysis method will be used to analysis the data collected through questionnaire. In order to conclude most significant factors from the general factors.

KEYWORDS: E-Commerce, Factors affecting online shopping, barriers for adoption online shopping.

EXPLORATION OF ALTERNATIVE LEATHER FOR THE FASHION INDUSTRY- A CASE STUDY

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ABSTRACT

The objective of this study was to determine how much a fashion consumer of all age knew, used, and felt about leather and leather substitutes. Vegan Leather (usually created with plastic coverings) and Eco-Friendly Leather Alternative (materials that are "good" for the environment) were the two types of leather substitutes. Also done a study on available latest trends on leather alternates. Data was gathered via a questionnaire with open- and closed-ended questions from a convenience sample of fashion consumers, including inquiries regarding the participant's familiarity with and experience with leather and leather alternate products. They were also questioned about their understanding of tanning of leather and its impact to environment. Participants' viewpoints and attitudes toward using leather and leather substitutes varied, according to the main findings. Most respondents had not heard of the eco-friendly leather substitutes / alternatives, and most have given positive feedback on alternate leather vs natural leather with respect to sustainability. The findings have implication for a number of stakeholders involved, including producers of leather substitutes / alternates, fashion institutes, and retail businesses. To clarify the distinctions between leather substitutes that employ plastic toxins and leather substitutes that were better for the environment, it was found necessary to define specific words. Alternative words for leather were used interchangeably, which confuse the consumers with the actual products they were buying. The consumer's product knowledge is essential for the sustainability of technology, especially as the trend toward sustainable fashion has gained steam in recent years. In order to assess their understanding of the sustainability idea, a survey was performed among people in the age range of 20–45 mostly college students, young entrepreneurs, and employees from India and few from abroad. The analysis' findings show that consumers are aware of how alternate leather has an impact on the environment.

The researchers came to the conclusion that producers of leather substitutes could use these findings to recognize the necessity of properly educating their clientele. Exposure to facts about their products' manufacture and component usage in regard to environmental and sustainability concerns should be provided as part of education. Consumers do not frequently have access to this exact information, thus additional education is required.

KEYWORDS: Alternate leathers, vegan leather, faux leather, organic leather, leather, fashion leather

MASSTIGE APPAREL BRANDS: CRITICAL REVIEW & PROPOSITIONS

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ABSTRACT

This is a critical review and a proposition paper based on literature of masstige apparel brands. This paper throws light on what is masstige brands, its need and its emergence in Luxury goods Management. This paper critically examines the targeted consumers and antecedents of their consumer behavior towards masstige apparel brands. Different marketing strategies of masstige apparel brands are critically examined. Theoretical propositions and a theoretical business model would be the outcome proposed by a researcher in this paper. The antecedents of the models and the business model can be used to formulate the Masstige apparel brand marketing strategy by an apparel company.

KEYWORDS: Masstige Brands, Luxury goods Management, Consumer Behavior in Masstige Brands, Antecedents

EVALUATION STUDY ANALYSIS ABOUT NON-LEATHER SHOES- VINYL MATERIAL VS NATURAL MATERIAL SHOES - BANANA FABRIC

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ABSTRACT

India is the Second largest footwear producer and also the second largest consumer of footwear Indian Footwear industry comprises both leather and non-leather materials. Its assembling interaction include natural leather and non-ecofriendly materials which may prompt item protests and dismissal. This investigation addresses an assessment between two materials namely Vinyl and banana fabric, tensile strength and sole bond adhesion of Shoes. Banana fabric is biodegradable, environmentally friendly breathable, sustainable and durable. Quality has been viewed as a fundamental piece of any factor just as an assembling measure. The status and future development of an association is chosen by its quality. Nature of shoes is turning into an extremely critical part of the present most serious time. This cycle means to comprehend the procedures of vinyl and banana fiber fabric material and furthermore boundary determination.

KEYWORDS: Vinyl, Quality, Testing, Banana fiber fabric Properties, environmentally friendly textiles

ENGINEERING PROPERTIES OF FOXTAIL MILLET GRAINS

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ABSTRACT

Design and development of post-harvest machinery needs information about various engineering properties. The present study focused to measure various engineering properties such as length, breadth, thickness, geometric mean diameter, arithmetic mean diameter, equivalent mean diameter, Length-breadth ratio, sphericity, 1000 kernel mass, bulk density, true density, porosity, angle of repose, coefficient of static friction, coefficient of internal friction, hardness and terminal velocity of foxtail millet using standard methods. Raw foxtail millets after procured from local market was cleaned to remove dust and impurities. The engineering properties of foxtail millet was recorded at 10.9 % moisture (% db). The results of the study revealed that, the length, width and thickness of foxtail millet was found to be 1.878 ± 0.084 , 1.467 ± 0.041 and 1.258 ± 0.061 mm respectively. Arithmetic mean diameter, geometric mean diameter and equivalent mean diameter of foxtail millet was found to be 1.534 ± 0.055 , 1.513 ± 0.054 , 1.516 ± 0.053 mm respectively. The sphericity, L/W ratio, thousand grain weight, terminal velocity and hardness of foxtail millet grains was found to be 0.806 ± 0.016 , 1.28 ± 0.29 , 3.126 ± 0.11 g, 3.82 ± 0.08 m/s and 22.383 N respectively. The bulk density, true density and porosity of foxtail millet was found to be 701.2 ± 16.27 (kg/m³), 1385.2 ± 6.98 (kg/m³) and 49.376 ± 1.33 % respectively. The frictional properties of foxtail millet were found to be angle of repose (29.66 ± 0.62 degree), coefficient static friction with mild steel (0.288 ± 0.02) and cast iron (0.31 ± 0.02) and coefficient of internal friction with mild steel (0.47 ± 0.03) and cast iron (0.512 ± 0.03). These engineering properties further will be used for development of pneumatic type millet dehuller.

KEYWORDS: Foxtail millet, terminal velocity, hardness, length, breadth and thickness.

Index

A	C
A. Baqual M.F..... 17	C.M. Yadav..... 18
A. H. Ganie 6	C.N. Srivastava 44
A. K. Pandey 1	Chanchal Singh 8
A. K. Singh..... 7	Chelpuri Ramulu..... 8, 20, 28
A. Kundu..... 46	
A. R. Rafiqui 6	D
A.K. Pandey 38	D. K. Deokar 37
Aakash Dewangan..... 67, 71, 72, 73, 76	D. K. Tiwari 7, 9, 13, 20, 23, 24, 30
Aashi Jain..... 68	D. Ramesh..... 84
Abhay Kumar 12, 25	D.K. Singh 12
Abhik Patra 7, 9, 19, 20, 22, 23, 24, 30	D.K. Tiwari..... 46
Abhik Patra ¹ 13	D.P. Malik..... 11
Abhik Patra ³ 18	D.S. Ahlawat..... 48
Abhinav Kumar Singh..... 20, 23, 24, 30	Dahiwale P. A 34
Adeel Ahmad Khan..... 41	Dar Junaid Bashir..... 16
Aisha Nabi..... 32	Dar, K. A..... 36, 45
Ajaz Ahmed Wani..... 41	Dattatray Chandam 48, 49
Ajinkya Patravale..... 48, 49	Deepaasha Sahu 64
Akanksha Srivastava 51	Deepasha Sahu..... 16, 31, 65, 66
Alka Goel 69, 76, 81	Deokar D.K..... 34
Amber Khan..... 62	Dhiraj K. Singh 25
Amit 6	Dhiru Kumar Tiwari 8, 28
Anamika Jain..... 43	Digambar Kumbhar 48, 49
Anand Kumar 29	Divya Bhatia 52
Ananya 72	Durga Prasad..... 57, 58, 59, 60
Anil Kumar 65, 66	
Ankit Patel..... 50	E
Anoop Singh Rana 83	Ephshita Sehgal..... 71
Anshu Gangwar..... 29	
Anupama Kumari 13, 20, 24, 30	F
Anupama Kumari ³ 23	F. Jeelani 32
Anurag..... 35	F.I.Qadri..... 46
Apoora..... 32	
Arun Gaikwad 73	G
Arun Kumar 32	Gagan Kumar..... 7, 9, 20, 22, 24, 30
Arun Kumar Gaikwad 80	Gangwar S K..... 47
Arvind Kumar Singh 29	Ganie, A. H..... 36
Ashish Rai 29	Ganie, N. A 36, 45
Ashok Chaudhari..... 53	Gaurav Singh 82
Aurangzeb Anjum 37	Gayatri 14, 76
Avinash Bajpai 72, 80	Gayatri Kumari Padhi 29
Ayoub, O. B 45	Gaytri Tiwari..... 77
	Gitanjali Rathore..... 56
B	Gowthamchand N J..... 56
B. B. Chopade 74	Gulshba 47
B. K. Singh..... 30	Gurpreet Kour 44
Babita Bhandari..... 67, 70	
Bhushan Kumar..... 22	H
Bhushan Kumar Singh 24	H.L.Bugalia..... 18
Biswarup Mehera 18	Harshad Brahmhat 50
Biswrup Mehra..... 19	
BL Choudhary..... 64	

Section-1 Value addition in traditional crops

Harshavardan J Hilli.....	19
Hukuma Ram	16

I

I L Khan	63
I. A. Lone	32
I. L. Khan	6
I.L.Khan	17, 46
Iqbal Jeelani Bhat.....	50
Iram Iqbal.....	32
Ishtiyag Ahmad Bhat.....	63

J

J. P. Jaiswal	26
Jeer Vinayaka	29
Jogender	48
Joginder Kumar.....	5
Jyoti Sharma.....	40, 44

K

K. S. Yadav	7
K.A.Dar	46
K.C.Nagar	18
Kalpna Sudan	39
Kamble D.K	34
Karan Kumar.....	45
Khan, I. L	36
Khushboo Sharma	40
Krishan Pal.....	65
Krishi Sarin	71, 74
Kuldeep Ghorapade.....	84
Kumar G.....	47
Kundu M S	47

L

Lalit Mohan.....	44, 45
Leela Chauhan.....	15

M

M F Baqual.....	63
M R Mir	63
M. Bashir.....	63
M. F. Baqual.....	6
M. Monobrullah	25
M. R Mir	17
M. R. Mir	6
M. S. Kundu	20, 22, 23, 24, 30
M. S. Kundu ³	13
M.F. Baqual.....	41, 46
M.S. Kundu	8, 28
Madhukar Deshmukh	48, 49
Malkani P	47
Mamta Singh.....	7
Manish Kumar.....	14, 47, 64
Manju Mehta	55
Manoj Kumar	3, 41, 42, 43

Manoj Kumar Para.....	73
Manoj Kumar Paras	69, 70, 76, 77
Manpreet Kaur	56
Masrat Bashir	16
Masrat Bashir	46
Md. Monobrullah.....	12
Meena Sewhag	48
Meena Yadav	50
Meghashri S. Patil.....	26
Misal Nivrutti Vinayak	5, 68
Muhammad Akram	4
Muskan Narang	69

N

N.A.Ganie	46
Naveena Nazim.....	17
Neeraj.....	11
Neeraj Pawar.....	48
Neeraj Sharma.....	82
Neha Loach.....	44, 45
Nirmodh Prabha	4, 54
Nitesh Krishnan J.....	67, 71, 72

P

P. Kumawat.....	18
Pankaj Malkani	20, 22, 24, 30
Pankaj Singh	40
Parveen Maan	72
Patra A	47
Piverjeet Kaur Dhillon	39
Piyush Panwar.....	15, 65
Pooja Singh.....	81
Pradeep John Kerketta	71, 74
Pradeep Kumar Shukla	73
Pradhnyal Kulkarni	61
Pragnya Priyadarshini Panda	77
Prasad Patil	48, 49
Prashant Yadav	27
Princee	64
Priti Mathur.....	66
Priyanka Mohire	48, 49
Priyanka Tolambiya	53
Priynka Sharma.....	49

R

R K Sharma.....	63
R. K. Jha	20, 30
R. K. Sharma.....	6
R. P. Singh	7, 9, 13, 18, 19, 20, 22, 23, 24, 30, 57, 58, 59, 60
R.K Sharma.....	46
R.K. Raman	25
R.K. Tiwari,.....	46
R.K.Jha	15
R.K.Sharma.....	16, 17
R.P. Singh	8, 28
Raaz K Maheshwari	16, 64
Raaz K. Maheshwari.....	31, 65, 66
Rafiqui, A. R.....	36, 45

Vision 2047: Sustainable Developments towards Atma Nirbhar Bharat (VSANB-2022)

Rahul Kapoor	19
Rajeev Bharat,M	50
Rajeev Singh	25
Rajendra R. Dandawate	35
Rajesh Kumar Sharma	71
Rajesh Parashar	82
Rajesh Sharma	74
Rakesh Kumar	12, 25
Ramkewal	12
Ranjan Kumar	8, 28, 46
Rashmi	14
Rashmi Singh	38
Ravi Sharma	16
Ravinder Kr. Sharma	4, 54
Ravinder Sharma	17
Ritesh Meel	16, 31, 64, 66
Rohan Kumar Raman	12
Ruchi Sharma	4, 17, 54

S

S. K. Singh	19
S. S. Jadhav	37
S. S. Kamble	37
S. Thapak	35
S.A Mir	17
S.K Gangwar	46
S.K. Gangwar	7, 8, 9, 13, 20, 22, 23, 24, 28, 30
S.K. Rai	15
S.K.Rai	32
S.P. Singh	44
S.Qayoom, Farida	17
Sabiha Ashraf	32
Saikhom Debina Chanu	78
Sakhare P.S	34
Sakshi	76
Salwinder Singh Dhaliwal	56
Sanganabasav G. Gollagi	21
Sanganabasav Gollagi	21
Sangeeta Deo	14
Sangita Sharma	50, 51, 53
Sanjay Kumar	46
Sanskriti Sindhu	29
Sapna	63
Sarini Singh	73, 76
Satya Prakesh	79
Saurabh Dubey	8, 28
Savidh Khan	49
Savita Kumari	79
Shaheen K. Jan	32
Shashank Singh	18, 19
Shefalee Singh	42
Sheza Farooq	41
Shikha Dwivedi	42
Shikha Shukla	40
Shilesh Kumar	32
Shirshat Tejashwini Kapil	29
Shivani Sharma	44, 45

Shounak Joshi	61
Shreya Baranwal	10
Shruti C Jugati	21
Shubham Chavan	61
Shweta Dhiman	70
Singh B K	47
Singh R P	47
Sradha Kumari	79
Subhangi Singh	18, 19
Subhash Chander	70
Subhashisa Praharaj	8, 20, 28
Sudip Sarkar	12, 25
Sumeet Grewal	78
Sumit	5, 11
Sunil P. Trivedi	41, 42
Suraj Kumar	29
Suresh Kumar	39
Swapnil Katyayan	27
Swati Sahu	69

T

T. A Sheikh	32
T. Loganathan	75
T. Rama Sastri	84
Tanaji Bhosale	48, 49
Twinkle	55

U

Uday Raj Gaurav	10
Ujjwal Kumar	12, 25
Umesh Patel	35
Umme Laila	4
Urmila Mehra	31
Utpal Kant	15

V

V.N.Khune	35
Vandana Kumari	15
Vanni Sharma	77
Varun Gupta	68
Vijay Kumar	5, 11
Vikas Sharma	50
Vinod Kumari	70
Virat Dubey	68
Virendra Tiwari	38
Vishlesh Patel	51
Vishram Karande	48, 49
Vishva Kumar	75
Vivak M. Arya	50
Vivek Sharma	56

Y

Yashahsvi Gupta	68
Yogesh Kumar	6