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INNOVATIVE CROPPING SYSTEM OF WATER CHESTNUT-LATE SOWN WHEAT FOR THREE FOLD INCOME (SRA MODEL-2)

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ABSTRACT
The study was under taken in seepage water affected area from 2005-06 to 2015-16 at adjoining of villages *Bhanwat*, Mainpuri. The main objective was to increase the farm families income more than three fold. The secondary objective was to raised the wheat crop under organic farming after green manuring of water chestnut green biomass and increase the fertility status of soil. Three cropping systems *i.e*., water chestnut-wheat *K-7903*, water chestnut-wheat *K 9423* and water chestnut-wheat *PBW- 373* were tested. The *Kanpuri* cultivar of water chestnut was used in the study. The average nut yield of water chestnut was recorded 80.00 q/ha, while average wheat yield noted by 35.00 q/ha after plucking of water chestnut. The system productivity was computed by 107.72 q/ha. The net return and BCR were obtained by Rs. 45000/ha & 1:1.60, respectively, from water chestnut. Similarly, late sown wheat gave net return and BCR by Rs. 18250/ha & 1:1.46, respectively. Water chestnut inclusion in water chestnut-late sown wheat cropping system increased the farm families' income > 3 fold.

KEY WORDS: Farm families, Green biomass, Seepage water, Three fold income, Water chestnut.

INTRODUCTION

The water chestnut (*Trapa natans* Linn) called *Singhara* in hindi is an aquatic herb floating in fresh water ponds. It has long flexuos stem, triangular leaves, white flowers and two spiny fruits, which is ascending on water. Therefore, water chestnut is a member of caltrop family trapaceae. Water chestnut, fruits contains citric acid, tannin, amylose, amylopectin, carbohydrate, beta-amylase, phosphorylase, protein, fat, nicotinic acid, riboflavin, thiamine, vitamins A & C and manganese. Its fruits are used as medicine in diarrhoea, dyscrasia, leucorrhoea, pregnant women given with milk in nervous and general debility & seminal weakness and stem juice in opthalmic infections. Water chestnut also acts as astringent nutritive, tonic, refrigerant, stomachic, anti-inflammatory and spermopoetic. The experience gained from water chestnut ponds, situated in left and right bank of G.T. Road at Bhogaon, Mainpuri. The dense cultivation of water chestnut is being done in these ponds. After picking of *Singhara* fruits the rest green biomass left in these ponds. After water receding from ponds partial green matter is decompose and rest dry up *in situ*. The decomposed green material developed organic matter richness in the ponds soil.

The canal irrigated area in Mainpuri district of Uttar Pradesh is 51341 ha (Anonymous, 2012), out of which a lot of seepage water affected area is situated in the vicinity of canal. The farmers utilize these lands only for growing of late sown wheat under mono cropping system. Therefore, the farm families of this subjected area depend upon wheat generated income. Keeping the above point in view the quite flexible plan for changing of fallow-wheat mono cropping system in water chestnut-late sown wheat double cropping system was planned. Therefore, for increasing the system productivity and more than threefold profitability with water chestnut-late sown wheat is subject matter of this manuscript.

MATERIALS AND METHODS

The trial was under taken in seepage water affected area, during 2005-06 to 2015-16 at village *Bhanwat*, Mainpuri on farmer's fields. The main objective was to increase the farmers income more than two fold. The secondary objective was to grow wheat crop under organic farming after green manuring of water chestnut green biomass left after nut harvesting and improve the fertility status of soil. The soil samples were collected from the representative area and composite sample drawn for nutrients analysis. The experimental soil was sandy clay loam, having pH 8.5, organic carbon 0.45%, total nitrogen 0.04%, available phosphorus 9 kg/ha and available potassium 276 kg/ha, thus, the nutrients of experimental soil were analysed low in organic carbon, total nitrogen, available phosphorus and high in available potassium. The pH was determined by Electrometric glass electrode method (Piper, 1950), while organic carbon was determined by Colorimetric method (Datta, *et al.*, 1962). Total nitrogen was analysed by Kjendahl's method as discussed by Piper (1950). The available phosphorus and potassium were determined by Olsen's method (Olsen *et al.*, 1954) and Flame photometric method (Singh, 1971), respectively. Three cropping systems *i.e*., water chestnut-wheat *K-7903*, water chestnut-wheat *K 9423* and water chestnut-wheat *PBW-373* were tested. The bunded fields filled with canal water and water chestnuts cutting of Kanpuri cultivar were planted between mid May to mid June every year of study. About 31250 cuttings of water chestnut were planted in

one hectare area. The picking of fruits was started from second week of October and nuts plucked every day upto first week of December in the study period. The recommended organic base agronomical practices were followed in the cultivation of water chestnut. After last picking about 150 q/ha green biomass of water chestnut was turned up into soil for green manuring. Due to tenderness, it rotten very fast. After rotting of green biomass, field was pulverized through ploughing for sowing of wheat. The wheat sowing was started from the last week of December and continued till first fortnight of January in every year. Wheat varieties *K-7903, K-9423* and *PBW-373* were planted under late sown condition and these varieties harvested after 100DAS. The recommended organic farming practices were followed. The irrigations were given at short intervals.

RESULTS AND DISCUSSION

The pooled data of eleven years have been reported in Table-1 and discussed here under appropriate heads.

System productivity

Results displayed that water chestnut produced the nuts by 80.00 q/ha. At initial years the productivity of nuts was found lesser over the last year observation. This was due to experience of farmers, which engaged as partnership in the study. The average grain yield was reaped by 35.00 q/ha under late sown condition.

Among the wheat cultivars, the highest average grain yield harvested from *PBW-373* by 37.40 q/ha, while minimum average yield 32.00 q/ha produced by *K-7903* under late sown condition. Cultivar *K-9423* yielded average grain yield by 35.60 q/ha. Therefore, the average yield of wheat was weighed by 35.00 q/ha after water chestnut. The system productivity was computed by 107.72 q/ha.

System profitability

The cost of cultivation for growing of water chestnut was calculated Rs. 75000/ha. The gross return, net return and BCR were obtained by Rs. 120000/ha, Rs. 45000/ha and 1:1.60, respectively. Similarly, cost of cultivation for raising of late sown wheat was recorded by Rs. 39500/ha. The gross return, net profit and BCR were computed by Rs. 57750/ha, Rs. 18250/ha and 1:1.46, respectively. Therefore, net profit results clearly displayed that inclusion of water chestnut in cropping system of water chestnut-late sown wheat increased the income of farm families more than 3 fold (Table 1). The similar results have also been reported by Singh *et al.* (2017).

TABLE 1: Yield and income generated from water chestnut – late sown wheat cropping system (pooled data of eleven years)

S.N	Treatment	Yield (q/ha)		System productivity (q/ha)	System profitability (Rs/ha)				Income increase in fold
		Water chestnut	Wheat		Cost of cultivation	Gross return	Net return	BCR	
1.	Water chestnut – wheat *PBW-373*	80.00	37.40	110.12	114500	181710	67210	1.58	3.68
2.	Water chestnut – wheat *K-7903*	80.00	32.00	104.72	114500	172800	58300	1.51	3.19
3.	Water chestnut – wheat *K-9423*	80.00	35.60	108.32	114500	178740	64240	1.56	3.52
	Mean	80.00	35.00	107.72	114500	177750	63250	1.55	3.46

CONCLUSION

The farmhouse holds residing in the vicinity of canal water affected seepage area and their holdings suffer from the seepage factor may be advocated for adoption of water chestnut – late sown wheat cropping system. It increases the farm income of farmers > 3 fold.

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