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SCREENING OF FIELD BEAN GENOTYPES FOR DOLICHOS MOSAIC VIRUS RESISTANCE

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ABSTRACT
Under green house condition, 75 field bean genotypes were screened, Kadale avare showed moderately resistant reaction, 22 genotypes showed susceptible reaction and remaining 52 genotypes showed highly susceptible reaction. 62 Pendal avare (Perennial) genotypes were screened under green house condition. Among the 62 genotypes, GLP- 44, GLP- 41, GLP- 42, GLP- 2, GLP-40, GLP- 65, GLP- 68 showed resistant reaction, 21 showed moderately resistant reaction, 14 showed susceptible reaction, 14 showed moderately susceptible reactions and remaining 6 showed highly susceptible reaction and none of them were immune to Dolichos mosaic virus under green house condition.

KEY WORDS: Pendal avare, genotypes, Dolichos.

INTRODUCTION

Field bean, *Lablab purpureus L*. also called as *Dolichos* bean or hyacinth bean belongs (Fabaceae) is native of India and mainly cultivated as an inter crop with cereals. It is presently grown throughout the tropical parts of Asia, Africa, West Indies, China and India. Within India, Field bean is cultivated to a large extent in Karnataka and adjoining districts of Tamil Nadu, Andhra Pradesh and Maharashtra. Karnataka contributes a major share, accounting for nearly 90% in terms of both area and production in the country. Karnataka state records production of about 18,000 tonnes from an area of 85,000 hectares (Anon, 2012). In Southern India, this crop is grown for fresh green pods used as vegetable, dry seeds for preparations of various dishes and the other plant parts as fodder for livestock. The green pods contain a small amount of vitamin A,C, proteins, iron and rich in calcium. The nutritive quality of *Dolichos* bean is better than that of French bean (Aykroyd, 1963). The ripe seed contains 20 to 28% protein (Schaaffhausen, 1963). Several diseases and pests have been reported on Field bean (Duke, 1983). First Report of Bean common mosaic virus infecting Field bean in India was reported by Udayashankar *et al.* (2011). The virus belongs to the genus Potyvirus (family Potyviridae). It was designated as Dolichos mosaic virus (DMV) in India and transmitted by aphids in a non-persistent manner and also transmitted by seeds and it causes yield loss upto 40 per cent.

MATERIALS & METHODS

Studies were undertaken to test the resistance of Field bean genotypes against Dolichos mosaic virus disease. Green house experiment was conducted in the green house of Department of Plant Pathology, UAS, GKVK, Bangalore. 75 Field bean genotypes and Sixty two Pendal type genotypes were evaluated for their reaction to Dolichos mosaic virus disease under green house condition during 2013-14. Field bean genotypes were collected from Kirk House Trust, ZARS, UAS, G.K.V.K. Bangalore. 8-10 days old seedlings of each variety were mechanically inoculated with DMV. The inoculums of the viruses were prepared by grinding infected leaves of young plants with sterilized mortars and pestles in buffer of 0.05 M dipotassium hydrogen orthophosphate (K_2HPO_4), PH 7.5 at the ratio of 1: 2 (tissue weight; Buffer volume). Leaf surfaces of plants to be inoculated were dusted with cellite (600 mesh) at the rate of 0.025g/ml of the extract and 0.02 % Mercaptoethonol was added. The inoculum was applied gently on the upper surface of the leaves with a small piece of absorbant cotton wool. The inoculated leaves were washed 1-2 minutes after inoculation to remove the excess of inoculums with a fine jet of distilled water from a squeeze bottle and plants were kept under observation for 15–20 days in the glass house with temperatures at 25- 28^{0}C. Percent disease incidence was calculated by using the following formula.

$$\text{Per cent disease incidence} = \frac{\text{No. of plants infected}}{\text{Total no. of plants inoculated}} \times 100$$

The genotypes were later grouped into different categories based on 0-5 scale from immune to highly susceptible (Diwakar and Mali, 1976).

Disease severity was scored by visual means using a 5 – point scale; 0= no infection (i.e. no symptom was observed on the leaves), 1 = Resistant (1- 5% of the leaves expressed symptoms), 2= moderately resistant (symptoms appeared on 5 -15% of the leaves), 3= Moderately susceptible (symptoms appeared on 15-25% of the leaves), 4= Susceptible (symptoms appeared on more than 25–50% of the leaves) and 5 = Highly susceptible (symptoms appeared on more than 50 % of the leaves). These viruses

caused systemic symptoms to the diseased plants, the incidence and severity of field bean viral infection differed widely among the varieties. The incidence of infection ranged from 0 to 100 percent.

RESULTS & DISCUSSION

Under green house condition, 75 Field bean genotypes screened against virus causing mosaic disease in Field bean is presented in Table 1. Among 75 genotypes, Kadale avare genotype showed moderately resistant reaction, 22 genotypes showed susceptible reaction and remaining 52 genotypes showed highly susceptible reaction.

TABLE 1: Grouping of Field bean genotypes based on their reaction against Dolichos mosaic virus of Field bean under green house condition

Scale	Description	Category	Genotypes
0	No plants showing symptoms	Immune	-
1	1-5% or less plants exhibiting symptoms	Resistant	-
2	5-15% plants exhibiting symptoms	Moderately Resistant	Kadale avare
3	15-25% plants affected	Moderately Susceptible	-
4	25-50 plants affected	Susceptible	GL-577, GLB-466, GLB-520, GLB-564 GL-621, GL-403, GL-199, GL- 438, GL- 456, GL-463, GL- 238, GL -412, GL-524, GL-10, GL-579, GL-355, GL-561, GL-660, GL-372, GL-506, GL-439, GL-479.
5	>50 plants exhibiting symptoms	Highly Susceptible	GL-385, GL-66, GLB-370, GL-12, GL-640, FPB-35, GL-80, GL-479(A), GL-289, GL-382, GL-376, GL-247, GL-252, GL-205, GL-391, GL-201, GL-360, GL-658, GL-250, GL-6, GLB-291, GLB-145, GLB-535, GLB-426, GLB-486, GL-68, GL- 606, GL-110, GL- 547, GL- 370, GL-515, GL-530, GL- 447, GL- 444, GL-174, GLB-568, GL-418, GL-576, GL-441, GL-661, GL-432, GL-633, GL-142, GL-95, HA-3, HA-4, GLB-527, GL-331, GL-326, GLB-453, GL-434, GL-228

TABLE 2: Grouping of Pendal avare genotypes based on their reaction against Dolichos mosaic virus disease of Field bean under green house condition

Scale	Description	Category	Genotypes
0	No plants showing symptoms	Immune	-
1	1-5% or less plants exhibiting symptoms	Resistant	GLP- 44, GLP- 41, GLP- 42, GLP- 2, GLP- 40, GLP- 65, GLP- 68.
2	5-15% plants exhibiting symptoms	Moderately Resistant	GLP- 50, GLP- 45, GLP- 36, GLP- 32, GLP- 17, GLP- 8, GLP- 3, GLP- 19, GLP- 61, GLP- 67, GLP- 59, GLP- 63, GLP- 62, GLP- 64, GLP- 57, GLP- 53, GLP- 60, GLP- 35, GLP- 13, GLP- 73, GLP- 58
3	15-25% plants affected	Moderately Susceptible	GLP- 49, GLP- 38, GLP- 48, GLP- 39, GLP- 47, GLP- 18, GLP- 43, GLP- 70, GLP- 15 FT, GLP- 55, GLP- 74, GLP- 54, GLP- 6, GLP- 7,
4	25-50 plants affected	Susceptible	GLP- 46, GLP- 31, GLP- 33, GLP- 11, GLP- 16, GLP- 14, GLP- 52, GLP- 51, GLP- 69, GLP- 66FT, GLP- 12, GLP- 10, GLP- 20, GLP- 72,
5	>50 plants exhibiting symptoms	Highly Susceptible	GLP- 9FT, GLP- 71, GLP- 1, GLP- 4, GLP- 5, GLP- 34

Under green house condition 62 Pendal avare genotypes screened against virus causing mosaic disease in Field bean is presented in Table 2. Among the 62 genotypes, 7 genotypes like GLP- 44, GLP- 41, GLP- 42, GLP- 2, GLP- 40, GLP- 65, GLP- 68 showed resistant reaction, 21 genotypes showed moderately resistant reaction, 14 genotypes showed moderately susceptible reaction, 14 genotypes showed susceptible reaction and remaining 6 genotypes showed highly susceptible reaction to DMV under green house condition. Similar type of varietal evaluations were previously documented by several workers *viz*., Ittah and Binang (2012), Mahalakshmi (2005), Gumedzoe (1993), identified the resistance source in Cowpea varieties against Blackeye cowpea mosaic Potyvirus (BICMV). Narayan Rishi and Poonam Dhawan (1987) reported screening of 64 field bean cvs. against Bean mosaic and Bean yellow mosaic disease of Hyacinth bean under green house conditions. Genotypes HD- 91, HD- 104, HD- 98, HD-66, HD-10 and HD -93 were reported to be tolerent. Fifteen accessions and varieties of French bean (*Phaseolus Vulgaris* L.) were tested for their reaction to Bean common mosaic potyvirus (BCMV) by mechanical inoculations on the 10 days old seedlings in the screen house. Three accessions among the fifteen *viz*., Arka Komal, IIHR 909 and MFB-2 were diagnosed as susceptible based on symptoms. The remaining Twelve were resistant (Nalini *et al.*, 2006).

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