

Screening of Soybean Genotypes against White Fly and Yellow Vein Mosaic Virus

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ABSTRACT

The field experiment was carried out at Polasa Farm, Regional agricultural research station Jagtail during the Kharif, 2014-15 and 2015-16 on thirty soybean genotypes for carrying out screening for whitefly and YVMV incidence. Results showed that whitefly and YVMV incidence was observed maximum during flowering stage of crop that genotype KBS 23-2014 had the average lowest whitefly incidence (0.49 whitefly/3 leaves/Plant whereas the JS -335 had the highest whitefly incidence (6.23 whitefly/3 leaves/plant). Based on the visual observations the following genotypes RSC 10-46, AMS 1004, RVS 2008-24, KDS 753, JS 20-87, NRC 100 are completely free from YVMV incidence.

Keywords: Polasa Farm, Kharif, Genotype, Leaves

INTRODUCTION

Soybean, *Glycine max* (L.) Merrill ranks first among various oilseed crops and amongst its major constraints in yield, insects and diseases are the most important. Among these the whitefly *Bemisia tabaci* (Gennadius) is a serious pest and also as vector of yellow vein mosaic virus (YVMV). The yield loss caused by YVMV disease in soybean is about 30-50% and as high as 80% in severe cases (Nene, 1972). Selection of resistant soybean genotypes is the most effective measure against whitefly and YVMV. The present

study reports the results obtained on the screening of soybean genotypes against these.

MATERIALS AND METHODS

The field study was conducted during *kharif* 2014 -15 and 15-16 at Regional Agricultural Research Station, Polasa, Jagtail (27° 12' latitude 77° 05' longitude and 498.7msl), Telangana. Thirty genotypes were sown in furrows opened to a depth of 4-5 cm by hand liner. Row to row distance of 30 cm and plant to plant distance of 10 cm was maintained.

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Insecticides were not applied on the test site throughout the growing season. All the plots were rated for whitefly infestations during flowering stage when maximum infestation of the pest noticed. Observations on the population count of whiteflies were recorded on three leaves (one from upper, middle and lower leaves) from randomly selected ten plants of each replication at flowering stage. According to number of whiteflies, a scale was made as, 1 is high resistant (0.1 to 1 whitefly), 2 is resistant (1.1 to 2 whitefly), 3 is moderately resistant (2.1 to 3 whitefly), 4 is susceptible (3.1 to 4 whitefly) and 5 is high susceptible (4.1 to 5 whitefly) as suggested by Gulluoglu *et al.* (2010).

Simultaneous counts were also made on the number of YVMV affected plants. Evaluation was based on visual rating of the intensity of symptoms due to YMV disease transmitted by white fly on scale 1-9 scale (Siddiqui and Trimohan, 1999). Germplasms were evaluated row wise which are replicated twice at flowering stage of the crop growth. Rating 1 was given to those plants which were completely free from YMV disease; whereas those showing maximum disease incidence (complete chlorosis of leaves, poor growth and stunting of plants) were rated 9. The detailed description of rating scale 1-9 is given below.

Rating	Description
1.	Plants completely healthy
2.	Up to 5 percent plants showing chlorosis i.e. , yellow patches on leaves.
3.	Up to 20 per cent plants showing chlorosis
4.	Up to 30-35 per cent plants showing chlorosis.
5.	Up to 50 per cent plants showing chlorosis + curling of plants
6.	Up to 60 per cent plants showing chlorosis + curling of leaves
7.	Up to 70 per cent plants showing chlorosis + curling of leaves. Such plants start showing stunted growth.
8.	Up to 80 per cent plants showing chlorosis + curling of leaves. Such plants start showing stunted growth.

Almost all the plants show chlorosis + curling plants of leaves resulting in stunted and very poor growth of plants.

RESULTS AND DISCUSSION

Whitefly infestation at flowering stage

The whitefly population/ 3 leaves/plant ranged from 0.65 to 6.68 and 0.30 to 5.78 during *kharif* 2014 and *kharif* 2015, respectively (Table 1). The average white fly population per plant ranged from 0.49 to 6.23 and the mean of the both the seasons are presented as under. The genotype KBS 23-2014 (0.49)

recorded significantly lowest whitefly incidence compared to rest of the genotypes which was on par with Basara (0.61), MACS 1454 (0.64), Lsb (0.68) and Dsb 28-3 (0.69). The genotypes recording highest white fly incidence was JS-335 (6.23 whiteflies/3 leaves/ plant) followed by AMS 1002 (4.06) and VLS 88 (3.45) respectively. (Table 1)

Table 1: Whitefly incidence on different soybean genotypes during *Kharif*, 2014-15 and 2015-16 at RARS, Polasa, Jagtial

Genotypes	No. of white flies/3 leaves/plant		
	2014	2015	Pooled
AMS 1002	5.23 ^b (2.39)	2.90 ^{cd} (1.84)	4.06 ^b (2.13)
JS 20-98	2.48 ^{gh} (1.72)	0.83 ^{jk} (1.14)	1.65 ^{hi} (1.46)
KDS 869	0.98 ^{klm} (1.21)	0.50 ^{lmn} (0.99)	0.74 ^l (1.11)
RSC 10-46	2.25 ^h (1.65)	1.35 ^{lg} (1.35)	1.80 ^{ghi} (1.51)
DSb 28-3	1.00 ^{klm}	0.38 ^{mno}	0.69 ^{lm}

	(1.22)	(0.93)	(1.08)
NRC 116	3.25 ^{ef} (1.93)	1.33 ^{fgh} (1.35)	2.29 ^e (1.66)
DS 3102	1.43 ^{jk} (1.38)	1.63 ^e (1.45)	1.53 ^{ij} (1.42)
RVS 2008-24	3.68 ^{de} (2.04)	0.90 ^{ij} (1.18)	2.29 ^e (1.66)
AMS 1004	3.30 ^{ef} (1.94)	1.10 ^{hi} (1.26)	2.20 ^{ef} (1.64)
KDS 753	1.35 ^{kl} (1.35)	1.18 ^{gh} (1.29)	1.26 ^{jk} (1.32)
JS 20-87	1.68 ^{ij} (1.47)	1.38 ^{efg} (1.36)	1.53 ^{ij} (1.42)
VSL 88	4.30 ^{cd} (2.19)	2.60 ^d (1.75)	3.45 ^c (1.98)
RSC 10-15	2.65 ^{lgh} (1.77)	0.45 ^{mno} (0.97)	1.55 ⁱ (1.43)
DSb 24	1.05 ^{k^{lm}} (1.24)	2.83 ^d (1.82)	1.94 ^{fgh} (1.56)
RVS 2008-8	0.85 ^m (1.15)	1.38 ^{efg} (1.36)	1.11 ^k (1.26)
MACS 1454	0.73 ^m (1.10)	0.55 ^{lm} (1.02)	0.64 ^{lm} (1.06)
PS 1552	4.30 ^{cd} (2.19)	1.58 ^{ef} (1.44)	2.94 ^d (1.85)
JS 20-96	2.35 ^{gh} (1.68)	3.55 ^b (2.01)	2.95 ^d (1.85)
NRC 100	0.95 ^{lm} (1.20)	0.50 ^{lmn} (0.99)	0.73 ⁱ (1.10)
KBS 23-2014	0.68 ^m (1.08)	0.30 ^p (0.89)	0.49 ^m (0.99)
VLS-67	4.63 ^{bc} (2.26)	0.68 ^{kl} (1.08)	2.65 ^d (1.77)
Lsb-23	0.98 ^{k^{lm}} (1.21)	0.38 ^{mno} (0.93)	0.68 ^{lm} (1.08)
TS-13	2.88 ^{lg} (1.83)	0.50 ^{lmn} (0.99)	1.69 ^{ghi} (1.47)
Bheem	2.78 ^{fgh} (1.80)	1.20 ^{gh} (1.30)	1.99 ^{efg} (1.57)
Basara	0.88 ^m (1.17)	0.35 ^{no} (0.92)	0.61 ^{lm} (1.05)
AMS.MB-5-19	2.20 ^{hi} (1.64)	1.58 ^{ef} (1.43)	1.89 ^{fgh} (1.54)
EC212093 GP-56	1.00 ^{k^{lm}} (1.22)	1.28 ^{gh} (1.33)	1.14 ^k (1.27)
EC242093 GP-16	4.33 ^{cd} (2.19)	1.38 ^{efg} (1.36)	2.85 ^d (1.83)
JS-93-05	0.65 ^m (1.07)	3.18 ^c (1.91)	1.91 ^{fgh} (1.55)
JS-335 (LC)	6.68 ^a (2.67)	5.78 ^a (2.50)	6.23 ^a (2.59)
GM	2.38 (1.63)	1.45 (1.34)	1.91 (1.51)
SEM	0.06	0.03	0.03
CD@1%	0.23	0.12	0.13
CD@5%	0.17	0.09	0.09
CV(%)	5.22	3.90	3.20

Levels of resistance to whitefly

Among the thirty promising genotypes a perusal of Table 2 reveals that out of the thirty genotypes screened based on the white fly populations where two genotypes were

classified into highly susceptible (4.1-5.0) one genotype as susceptible (3.1-4.0) seven as moderately resistant (2.1-3.0) genotypes, thirteen as resistant genotypes (1.1-2.0) and seven genotypes as highly resistant (0.1-1.0)

white populations based on the scale given by Gulluoglu *et al.* (2010) by taking the pooled mean data of 2014 and 2015. Present results are in line with earlier workers where Gulluoglu *et al.* (2010) screened 208 soybean cultivars and found 78 to be highly resistant,

46 resistant, 43 moderately resistant, 23 susceptible and 18 highly susceptible. Gaur and Deshpande (1998) observed that NRC-12 and NRC-7 were tolerant to whitefly in Madhya Pradesh.

Table 2: Reaction of soybean genotypes against whitefly

Class	Genotypes	Total	Scale (1-5)
Highly Resistant (HR)	KDS-869, DSb 28-3, MACS 1454, NRC 100, KBS 23-2014, Lsb 23 and Basara	7	1
Resistant (R)	JS 20-98, RSC 10-46, DS 3102, KDS 753, JS 20-87, RSC 10-15, DSb 24, RVS 2008-8, TS 13, Bheem, AMS -MB- 5-19, EC212093GP-56, JS-93-05	13	2
Moderately Resistant (MR)	PS 1552, VLS 67, EC 242093GP-16, NRC116, RVS2008-24, AMS 1004	7	3
Susceptible (S)	VLS 88	1	4
Highly Susceptible (HS)	AMS 1002, JS-335	2	5

Based on the visual observations at flowering stage the genotypes were categorised into different classes of YVMV incidence.

Table 3: Categorization of Soybean genotypes based on YVMV incidence during Kharif, 2014-15 and 2015-16 at RARS, Polasa, Jagtial

Class	Genotypes	Total	Scale (1-9)
Plants completely healthy	RSC 10-46, AMS 1004, RVS 2008-24, KDS 753, JS 20-87, NRC 100	6	1
Up to 5 percent plants showing chlorosis i.e. yellow patches on leaves.	AMS 1002, DS 3102, NRC 116, DSb 28-3, KBS 23-2014, LSb 23, TS 13, PS 1552, Bheem, Basar, EC 242093 GP -16, KDS 869, JS 20-98	13	2
Up to 20 per cent plants showing chlorosis	JS 93-05, DSb 24, RSC 10-15, AMS –MB-19-5, EC 212093 GP-56	5	3
Up to 30-35 per cent plants showing chlorosis	VLS 88, JS- 335, MACS 1454, JS 20-96, VLS 67, RVS 2008- 8	6	4

From Table 3 it can be observed around six genotypes which were completely free virus infection. Around 13 genotypes have two rating YMV, whereas five genotypes have three rating YMV followed by six genotypes having four rating of YMV which was severe in both the seasons. Kumar *et al.* (2014) found that 21 genotypes with complete resistance and 31 highly susceptible. Talukdar *et al.* (2013) reported about 34 resistant genotypes.

CONCLUSION

Based on the screening studies carried on thirty soybean genotypes on whitefly and YVMV incidence the genotypes KBS 23-2014 (0.49 Whitefly/3 leaves/ plant) had the lowest and the genotype JS 335 (6.23 Whitefly/3 leaves/ plant) had the highest whitefly incidence. Based on the visual observations the following genotypes RSC 10-46, AMS 1004, RVS 2008-24, KDS 753, JS 20-87, NRC 100 are completely free from YVMV incidence. These studies are to be carried out in green house also to confirm the results.

REFERENCES

- Gulluoglu, L., Arioglu, H. and Kurt, C. 2010. Field evaluation of soybean cultivars for resistance to whitefly (*Bemisia tabaci* Genn.) infestations. *African Journal Agricultural Research*, 5(7): 555-560.
- Gaur, S. K. and Deshpande, R. R. 1998. Relative susceptibility of soybean *Glycine max* (E) varieties to insect pests complex. *Indian Journal of Plant Protection*, 26: 186-187.
- Kumar, B., Talukdar, A., Verma, K., Girmilla, V., Bala, I., Lal, S.K., Singh, K.P. and Sapra, R.L. 2014. Screening of soybean [*Glycine max* (L.) Merr.] genotypes for yellow mosaic virus (YMV) disease resistance and their molecular characterization using RGA and SSRs markers. *Australian Journal of Crop Science*, 8(1): 27-34.
- Talukdar, A., Harish, G.D., Shivakumar, M., Kumar, B., Verma, K., Lal, S.K., Sapra, R.L. and Singh, K.P. 2013. Genetics of yellow mosaic virus (YMV) resistance in cultivated soybean [*Glycine max* (L.) Merr.]. *Legume Research*, 36 (3): 263-267.