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Field screening of soybean genotypes against green semilooper, *Chrysodeixis acuta* (Fabricus)

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Abstract
The field experiment was carried out at Soybean Research Farm of Birsa Agricultural University, Ranchi during *Kharif* 2021 and 2022 with 35 genotypes along with two check genotypes. The pooled data of two consecutive years revealed that on the basis of overall pooled mean, *Chrysodeixis acuta* infestation ranged from 0.76 to 1.44 larvae/mrl. Among all the tested genotypes the least larval infestation was recorded in genotype BAUS-110 and it was followed by RCS-10-46 (0.80 larvae/mrl) which remained statistically at par with genotype BAUS-124 (0.84 larvae/mrl) and BAUS-118 (0.90 larvae/mrl). Whereas, maximum larval infestation was observed in BAUS-122 (1.44 larvae/mrl) which was at par with BAUS-115 (1.43 larvae/mrl). The results also showed that for the *Kharif* 2021, five genotypes viz., BAUS-110, BAUS-96, RCS-10-46, BAUS-18 and BAUS-120 were found to be highly resistant while in 2022, genotype BAUS-124 was found highly resistant whereas BAUS-110 and RCS-10-46 were found to be resistant.

Keywords: Green semilooper, soybean, screening, genotypes

Introduction

Soybean [*Glycine max* (L.) Merrill] is one of an important oilseed crop of India belonging to family Leguminosae. Multipurpose nature of soybean makes it valuable in the field of industrial formulations, agriculture sector and pharmaceuticals and thus it a unique crop. Thus, it also known as “Miracle bean, Golden bean, and Crop of the planet” which provide 40% protein, 20% oil, rich in poly unsaturated fats specially Omega 6 and Omega 5 fatty acids and 17-19% carbohydrates (Chauhan and Joshi, 2005) [3]. It is also the most affordable and abundant source of high-quality protein, making it a useful tool for treating protein-calorie deficiency. The rich crop development and soft, succulent leaves entice insects, providing them with lots of food, space, and cover. Soybean crop is infested by more than 275 insect pests throughout its growth stages and about a dozen of them have been reported to be causing serious damage to soybean from sowing to harvesting. About 15-25% of soybean output is lost due to insect pest fauna (Biswas, 2013) [2]. Among them green semilooper (*Chrysodeixis acuta*), tobacco caterpillar (*Spodoptera litura*), leaf miner (*Aproaerema modicella*), stem fly (*Melanagromyza sojae*), girdle beetle (*Obereopsis brevis*), and sucking insect pests such as white fly (*Bemisia tabaci*) and leaf hopper (*Amrasca biguttula biguttula*) are important. Cultivating insect-resistant or tolerant cultivars is the most cost-effective strategy to combat these insect pests and prevent yield losses (Awasthi *et al*., 2005) [1]. It is suggested that resistant plants be used to stabilize yields, as they offer many benefits over chemical insecticides. Additionally, it has been shown to be low-impact on the environment, minimize production costs, avoid requiring the transfer of new technology, and work well with existing pest management techniques (Pinheiro *et al*., 2005; Suharsono and Sulistyowati, 2012) [4, 5]. Present investigation was undertaken with the aim to screen some of the promising soybean genotypes for their resistance against green semilooper.

Materials and Methods

The experiment was laid out in randomized block design by using 35 genotypes including two check varieties as resistant check JS 97-52 and susceptible check JS 335, replicated two times with spacing of 45 x 10 cm and the plot size was 4 m x 3 m. The suggested techniques were followed when it came to field preparation, weeding, fertilizer application, and other crop management procedures. The larval population of green semilooper were recorded at 15, 30, 45 and 60 days after germination at five randomly selected spots of one meter row length leaving border rows in each plot. Four spots were selected in the corner and one in centre. At each spot 4 plants were randomly selected and tagged for taking observation.

The genotypes were categorized by the method given by Sharma, 1996 (AICRP method, 1996).

- HR: Value < mean - CD at 1%.
- R: Value between mean - CD at 1% and mean - CD at 5%.
- MR: Value between mean - CD at 5% and mean.
- LR: Value between mean and mean + CD at 5%.
- S: Value between mean + CD at 5% and mean + CD at 1%.
- HS: Value > mean + CD at 1%.

Results and Discussion

The observation regarding pooled mean of *C. acuta* infestation during the experimental years have been presented in Table 1. Larval population recorded at 15 DAG, 30 DAG, 45 DAG and 60 DAG ranged from 0.51 to 1.53, 0.73 to 1.44, 0.79 to 1.63 and 0.82 to 1.56 larvae/mrl respectively. At 15 DAG, the lowest population was observed in BAUS-118 (0.51 larvae/ mrl) which is followed by BAUS-40 (0.54 larvae/mrl) and BAUS-110 (0.60 larvae/mrl) but at 30 DAG, least larval count was found in BAUS-110 which is followed by RCS-10-46 (0.77 larvae/ mrl), BAUS-96 (0.82 larvae/mrl) and BAUS-124 (0.83 larvae/mrl). At 45 DAG, minimum incidence was recorded in genotype RCS-10-46 which is followed by BAUS-124 and BAUS-110 with 0.80 and 0.86 larvae/mrl respectively. While at 60 DAG, minimum larval incidence was recorded in genotype BAUS-110 which is followed by BAUS-124 (0.88 larvae/mrl) and RCS-10-46 (0.95 larvae/mrl).

The overall pooled mean *C. acuta* infestation varied from 0.76 to 1.44 larvae/mrl. Among all the tested genotypes the least larval infestation was observed in genotype BAUS-110 and it was followed by RCS-10-46 (0.80 larvae/mrl) which remained statistically at par with genotype BAUS-124 (0.84 larvae/mrl) and BAUS-118 (0.90 larvae/mrl). Whereas, maximum larval infestation was observed in genotype BAUS-122 (1.44 larvae/mrl) which was at par with BAUS-115 (1.43 larvae/mrl).

Based on the reaction of soybean genotypes against *C. acuta* infestation during *Kharif* 2021, five genotypes viz., (BAUS-110, BAUS-96, RCS-10-46, BAUS-18, BAUS-120) were found to be highly resistant, four genotypes (BAUS-124, BAUS-BRNS-20, BAUS-116, BAUS-106) were found resistant, seven genotypes (BAUS-119, BAUS-112, BAUS-123, BAUS-108, BAUS-109, BAUS-104, BAUS-BRNS-3) were classified as moderately resistant while nine genotypes (BAUS-40, BAUS-121, BAUS-125, BAUS-6, BAUS-BRNS-19, BAUS-114, BAUS-100, BAUS-105, JS-335, JS 97-52) showed low resistant, three genotype (BAUS-BRNS-18, BAUS-113, BAUS-101) was found to be susceptible and six genotypes (BAUS-117, BAUS- BRNS-14, BAUS-31, BAUS-122, BAUS-115, BAUS-107) showed highly susceptible. While in 2022, BAUS-124 was found highly resistant, BAUS-110 and RCS-10-46 were found to be resistant and two genotypes (BAUS -115, BAUS-122) were found to be susceptible (Table 2).

Earlier, numerous researchers tried to find out the source of resistance in many genotypes and in their research, they found a lot of entries, promising against different insect pests attacking soybean in different stages of crop growth. However, most of the genotypes screened in this experiment against green semilooper were new entries. Hence, there is no information are available to compare the present findings. It will take time to get the promising genotypes to be released.

Table 1: Pooled Larval population of green semilooper on different soybean genotypes during *Kharif* 2021 and 2022

Sr. No	Genotype	Mean larval population/mrl				
		15 DAG	30DAG	45DAG	60DAG	Overall mean
1	BAUS-110	0.38(0.61)abc	0.55(0.73)a	0.75(0.86)abc	0.68(0.82)a	0.59(0.77)a
2	BAUS-124	0.75(0.84)d-k	0.70(0.84)a-d	0.65(0.80)ab	0.78(0.88)ab	0.72(0.84)ab
3	BAUS-96	0.49(0.70)a-e	0.70(0.82)abc	1.00(0.99)a-e	1.20(1.08)a-d	0.85(0.91)ab
4	RCS-10-46	0.45(0.65)a-d	0.62(0.78)ab	0.65(0.79)a	0.95(0.95)abc	0.67(0.80)ab
5	BAUS-119	0.8(0.89)e-k	1.25(1.10)b-j	1.45(1.2)d-h	1.28(1.12)a-d	1.19(1.09)ab
6	BAUS-118	0.28(0.52)a	0.75(0.85)a-d	1.00(1.00)a-e	1.25(1.11)a-d	0.82(0.9)ab
7	BAUS-BRNS-20	0.50(0.69)a-e	0.80(0.89)a-f	1.05(1.02)a-f	1.53(1.23)a-d	0.97(0.98)ab
8	BAUS-120	0.68(0.82)c-k	0.75(0.85)a-d	1.00(1.00)a-e	1.25(1.11)a-d	0.92(0.96)ab
9	BAUS-116	0.60(0.75)b-g	0.93(0.95)a-g	1.00(1.00)a-e	1.35(1.16)a-d	0.97(0.98)ab
10	BAUS-112	0.68(0.81)c-k	1.17(1.07)a-i	0.95(0.97)a-d	1.68(1.29)a-d	1.12(1.05)ab
11	BAUS-121	1.53(1.23)lm	1.35(1.16)c-j	1.50(1.22)e-h	1.30(1.14)a-d	1.42(1.19)ab
12	BAUS-123	0.65(0.80)c-h	1.23(1.10)b-j	1.10(1.05)c-f	1.78(1.33)a-d	1.19(1.09)ab
13	BAUS-125	1.08(1.03)kl	1.65(1.28)g-j	1.60(1.26)fgh	1.45(1.20)a-d	1.44(1.2)ab
14	BAUS-6	0.55(0.73)a-f	1.50(1.21)d-j	0.98(0.99)a-e	2.45(1.56)d	1.37(1.17)ab
15	BAUS-117	1.48(1.21)lm	1.29(1.13)c-j	1.55(1.24)fgh	2.00(1.41)bcd	1.58(1.26)ab
16	BAUS-106	1.39(1.18)lm	1.39(1.15)c-j	1.25(1.11)d-g	1.05(1.02)a-d	1.27(1.12)ab
17	BAUS-BRNS-3	0.89(0.94)f-k	1.45(1.19)c-j	1.50(1.21)d-h	1.93(1.39)bcd	1.44(1.19)ab
18	BAUS-108	0.48(0.65)a-d	1.60(1.24)f-j	1.08(1.04)b-f	1.10(1.05)a-d	1.05(1.02)ab
19	BAUS-114	0.64(0.80)c-i	1.27(1.11)c-j	1.40(1.18)d-h	1.60(1.26)a-d	1.23(1.11)ab
20	BAUS-109	0.6(0.77)b-g	1.30(1.13)c-j	1.50(1.22)e-h	1.20(1.09)a-d	1.15(1.07)ab
21	BAUS- BRNS-18	1.67(1.29)m	1.40(1.18)c-j	1.60(1.26)fgh	1.50(1.22)a-d	1.54(1.24)ab
22	BAUS-BRNS-19	1.08(1.03)jkl	1.03(1.01)a-i	1.90(1.37)hij	1.40(1.18)a-d	1.35(1.16)ab
23	BAUS-105	0.76(0.87)d-k	0.93(0.96)a-h	2.53(1.59)jk	1.43(1.19)a-d	1.41(1.19)ab
24	BAUS-104	0.93(0.96)g-k	0.95(0.97)a-h	1.45(1.18)d-h	2.20(1.46)cd	1.38(1.16)ab
25	BAUS-40	0.25(0.55)ab	1.43(1.18)c-j	2.30(1.51)ijk	1.80(1.34)a-d	1.46(1.21)ab
26	BAUS-113	1.05(1.02)h-l	1.03(1.01)a-i	2.00(1.40)hij	2.30(1.52)d	1.6(1.26)ab
27	BAUS-101	1.05(1.02)i-l	1.27(1.11)c-j	1.75(1.32)ghi	2.15(1.46)cd	1.55(1.25)ab
28	BAUS-100	0.65(0.80)c-j	0.90(0.94)a-g	1.93(1.39)hij	1.90(1.38)a-d	1.34(1.16)ab

29	BAUS-107	1.75(1.32)m	1.80(1.32)hij	2.70(1.64)k	2.00(1.41)bcd	2.06(1.43)b
30	BAUS-122	2.36(1.53)n	2.10(1.45)j	2.30(1.52)ijk	1.60(1.26)a-d	2.09(1.45)b
31	BAUS-115	1.80(1.34)m	1.70(1.3)g-j	2.45(1.56)jk	2.10(1.45)cd	2.01(1.42)ab
32	BAUS-BRNS-14	1.44(1.20)lm	1.65(1.28)g-j	1.85(1.36)hij	2.10(1.45)cd	1.76(1.32)ab
33	BAUS-31	1.80(1.34)m	1.80(1.34)ij	2.00(1.41)h-k	1.80(1.34)a-d	1.85(1.36)ab
34	JS-335 (SC)	0.93(0.96)g-k	1.55(1.23)e-j	1.60(1.26)fgh	1.95(1.39)bcd	1.51(1.22)ab
35	JS 97-52 (RC)	1.50(1.22)lm	0.75(0.86)a-e	1.10(1.05)c-f	1.30(1.14)a-d	1.16(1.08)ab
	SE(m) ±	(0.066)	(0.062)	(0.070)	(0.094)	(0.110)
	CD at 5%	(0.191)	(0.181)	(0.203)	(0.272)	(0.319)
	CV%	(9.933)	(8.251)	(8.343)	(10.807)	(13.912)

Table 2: Categorization of soybean genotypes against green semilooper during *Kharif* 2021 and 2022

Genotypes	2021		2022	
	Cumulative mean	Status	Cumulative mean	Status
BAUS-110	0.51(0.71)ab	HR	0.66(0.81)ab	R
BAUS-124	0.90(0.92)cde	R	0.54(0.72)a	HR
BAUS-96	0.61(0.77)abc	HR	1.09(1.03)b-g	MR
RCS-10-46	0.50(0.70)a	HR	0.83(0.89)abc	R
BAUS-119	1.14(1.06)e-i	MR	1.25(1.12)c-j	MR
BAUS-118	0.78(0.87)bcd	HR	0.86(0.93)a-d	MR
BAUS-BRNS-20	0.91(0.95)def	R	1.03(1.01)b-e	MR
BAUS-120	0.78(0.87)bcd	HR	1.06(1.03)b-g	MR
BAUS-116	0.88(0.93)def	R	1.06(1.02)b-f	MR
BAUS-112	1.12(1.05)e-i	MR	1.11(1.05)b-h	MR
BAUS-121	1.58(1.25)j-m	LR	1.26(1.12)c-j	MR
BAUS-123	1.22(1.10)f-j	MR	1.16(1.08)b-h	MR
BAUS-125	1.49(1.22)i-l	LR	1.40(1.18)d-j	LR
BAUS-6	1.41(1.18)h-k	LR	1.33(1.15)c-j	LR
BAUS-117	2.06(1.43)nop	HS	1.09(1.03)b-g	MR
BAUS-106	0.96(0.98)d-g	R	1.58(1.24)e-j	LR
BAUS-BRNS-3	1.21(1.10)f-j	MR	1.68(1.28)e-j	LR
BAUS-108	1.11(1.03)d-h	MR	1.01(1.01)b-e	MR
BAUS-114	1.28(1.12)g-k	LR	1.18(1.09)b-i	MR
BAUS-109	1.15(1.07)e-i	MR	1.15(1.07)b-h	MR
BAUS- BRNS-18	1.65(1.28)k-n	S	1.44(1.2)d-j	LR
BAUS-BRNS-19	1.48(1.21)i-l	LR	1.22(1.1)c-j	MR
BAUS-105	1.49(1.22)i-l	LR	1.33(1.15)c-j	LR
BAUS-104	1.23(1.10)f-j	MR	1.53(1.22)e-j	LR
BAUS-40	1.41(1.19)h-l	LR	1.48(1.22)e-j	LR
BAUS-113	1.66(1.27)k-n	S	1.53(1.24)e-j	LR
BAUS-101	1.67(1.29)k-n	S	1.44(1.20)d-j	LR
BAUS-100	1.35(1.16)a-k	LR	1.34(1.16)c-j	LR
BAUS-107	2.35(1.53)p	HS	1.78(1.33)hij	LR
BAUS-122	2.25(1.50)op	HS	1.93(1.39)j	S
BAUS-115	2.16(1.47)op	HS	1.86(1.36)ij	S
BAUS-BRNS-14	1.85(1.36)l-o	HS	1.68(1.29)f-j	LR
BAUS-31	1.98(1.40)m-p	HS	1.73(1.31)g-j	LR
JS-335 (SC)	1.40(1.18)h-k	LR	1.61(1.27)e-j	LR
JS 97-52 (RC)	1.51(1.22)i-l	LR	0.81(0.90)abc	MR
Sem	(0.051		(0.082)	
CD at 5%	(0.147		(0.237)	
CV	(6.380		(10.393)	
CD at 1%	(0.197		(0.317)	

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