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Study the germination percentage of chickpea seeds infested by pulse beetle *Callosobruchus chinensis* under laboratory condition

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Abstract

Effect on germination of seeds of chickpea varieties / genotypes were studied under laboratory conditions in the Department of Entomology, College of Agriculture, JNKVV, Jabalpur (M.P.) during 2018-19. The germination was affected due to damage of Pulse beetle (*Callosobruchus chinensis*). Among all the varieties / genotypes, the healthy seeds of JG 11 x RVSSG 1 and JAKI 9218 were reported with germination of 71.33% (minimum) and 91.33% (maximum), while in the damaged seeds of the same cultivars, the germination was 24.67% (minimum) and 76.67% (maximum), respectively.

Keywords: chickpea, germination percent, pulse beetle, *C. chinensis* and store grain pest

1. Introduction

Chickpea like other pulses is exclusively used for human and cattle feed, serving as a main source of protein in the diet cum nutrition. In human diet, it is mostly used as dal (split pulse), besan (flour), crushed of whole grain, boiled parched or cooked, salted or unsalted or sweet roasted preparations and green foliage and grain as vegetable are important forms in which it is consumed by people. It is also used for cattle feed as concentrate and roughage. Thus the value of gram to our agriculture is immense. Agricultural scientists are now paying much attention to this crop and improved insect and disease resistant varieties of excellent yield potential have been evolved and are available for sowing.

Pulse beetle popularly known as Dhora is an important storage pest of chickpea in India. This includes three bruchid species, *C. chinensis* L., *C. analis* (Raina, 1970) [4] and *C. maculatus* (Fab) (Salunkhe and Jadhav, 1982) [5]. In ancient India, the various uses of resistant genotypes is considered as simple, easy, cheap and ideal method of combating pest problems, from the farmers' point of view, this can be most accept from pest control technique. Selection of resistant genotypes may be helpful in reducing pest damage. In the past several works, the scientists have made efforts to screen germplasm /genotypes to find resistant sources. There are certain parameters such as, seed characters which can influence the infestation of bruchids. The present investigation was conducted to study the germination percentage of infested seeds of different chickpea varieties and genotypes.

2. Materials and Methods

The response of chickpea varieties / genotypes on germination of seeds was studied under laboratory conditions in the Department of Entomology, College of Agriculture, JNKVV, and Jabalpur (M.P.) during 2018-19. Fifty grams of chickpea seeds from each variety/genotypes were kept for three months with bruchids and without bruchids separately in storage. After three months, percentage germination and viability of seeds for both sets were tested. One hundred seeds from each treatment were soaked in water for 24 hours in plastic cups, then wrapped in paper towels and kept for overnight. Observations on germination and normal growth of seedlings were recorded on first, second, third and fourth day after germination.

3. Results and Discussion

Experiment was conducted to record per cent germination of the selected 30 genotypes/varieties separately, with damage and healthy seeds. The results of present investigation have been presented in table 1 and figure 1.

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3.1 Infected seeds

Germination test was conducted with damaged seeds of chickpea genotypes. The germination of damaged seeds ranged from 24.67% (JG 11 x RVSSG 1) to 76.67% (JAKI 9218). Significantly lower germination percent was recorded viz., the genotype JG 11 x RVSSG 1 followed by ICCL 86111. In addition to these, the genotypes JG12 x JG16-1, ICC 3137, JG 130, JG 14 recorded comparatively higher germination percent and was found at par with each other. Following the series, JG 36, RVG 201, ICC 96029 x JG315, JG 12 x JG 16-3 were at par within themselves. The genotype ICC 15118 was next in series and was found to be at par with JG 24, ICC 552241 x JG 11, JG74 x JG11551, JG 63 x ICC 14407 and ICC 4958. These were further followed by JG 11 x JG14, DCP 92-3, JG 26 x ICC 251741 and JG 74315-14 which were at par with each other. Substantially, higher germination percent was found in JG 63 x ICC 4958 along with JG 2016-1624, ICC 96029 x ICC 11551, JG 2016-1, JG 315, JG 9605 x ICCV 06301, JG 23 x ICC 251741 and JG 12 which were all at par with each other. A significant higher germination percent was recorded from the genotypes JG 1307 x ICC 7441 and JAKI 9218 which were at par with each

other with the highest being of JAKI 9218.

3.2 Healthy seeds

Germination test was conducted with healthy seeds of chickpea cultivars. The data given in Table 6 show that significantly more germination per cent was found in JAKI 9218 (91.33). The genotype JG 11 x RVSSG 1 (71%) was recorded with significantly lowest germination percent and was at par with JG 74315-14, ICC 3137 and JG 2016-1. Further, the genotypes JG 63 x ICC 14407, JG74 x JG11551, JG 23 x ICC 251741, ICC 4958, JG 63 x ICC 4958, ICC 15118, JG 26 x ICC 251741, ICC 96029 x ICC 11551, JG 2016-1624, ICCL 86111 and ICC 552241 x JG 11 were all at par with each other and had comparatively higher germination percent. In addition to the series, JG 36, JG 11 x JG14, JG 130, JG12 x JG16-1, ICC 96029 x JG315, JG 9605 x ICCV 06301, JG 12 x JG 16-3, JG 315 and DCP 92-3 were at par with each other. The genotype JG 1307 x ICC 7441 along with JG 12, JG 14, RVG 201 and JG 24 were found to be at par with each other. Finally, the genotype JAKI 9218 was recorded with very high germination percent out of all the genotypes under study.

Table 1: Germination percent of healthy and infested seed of different genotypes/varieties of chickpea

S. No.	Genotypes /Varieties	Germination Percent	
		Infected	Healthy
1	JG 1307 x ICC 7441	68.67 (55.98)	87.33 (69.24)
2	JG74 x JG11551	47.33 (43.47)	77.33 (61.60)
3	ICC 15118	45.33 (42.32)	79.33 (63.00)
4	JG 74315-14	57.33 (49.22)	73.33 (58.92)
5	JG 11 x JG14	52.67 (46.53)	82.67 (65.43)
6	JG 12 x JG 16-3	38.67 (38.43)	85.33 (67.55)
7	ICC 96029 x ICC 11551	60.67 (51.17)	80.00 (63.60)
8	ICC 96029 x JG315	37.33 (37.63)	83.33 (65.96)
9	JG12 x JG16-1	30.67 (33.61)	82.67 (65.49)
10	JG 63 x ICC 4958	59.33 (50.39)	78.67 (62.56)
11	JG 9605 x ICCV 06301	62.67 (52.34)	84.67 (67.02)
12	JG 2016-1624	59.33 (50.39)	80.67 (63.96)
13	JG 26 x ICC 251741	53.33 (46.91)	79.33 (63.00)
14	JG 23 x ICC 251741	63.33 (52.74)	78.67 (62.53)
15	JG 11 x RVSSG 1	24.67 (29.75)	71.33 (57.63)
16	JG 63 x ICC 14407	48.67 (44.24)	77.33 (61.57)
17	ICC 552241 x JG 11	46.67 (43.09)	82.00 (64.92)
18	JG 2016-1	60.67 (51.18)	76.67(61.15)
19	JG 36	35.33 (36.47)	82.67 (65.40)
20	JG 24	46.67 (43.08)	90.00 (71.62)
21	JAKI 9218	76.67 (61.15)	91.33 (73.04)
22	JG 12	64.67 (53.54)	87.33 (69.24)
23	JG 14	33.33 (35.25)	89.33(71.05)
24	JG 130	32.67 (34.83)	82.67 (65.45)
25	JG 315	61.33 (51.57)	85.33 (67.55)
26	ICC 3137	31.33 (34.04)	76.67 (61.12)
27	ICC 4958	48.67 (44.24)	78.67 (62.53)
28	ICCL 86111	29.33 (32.77)	81.33 (64.45)
29	DCP 92-3	52.67 (46.53)	86.67 (68.63)
30	RVG 201	36.67 (37.26)	89.33 (71.05)
	SEm±	1.11	1.33
	CD at 5%	3.16	3.77

*figure in parenthesis (sin) are transformed values.

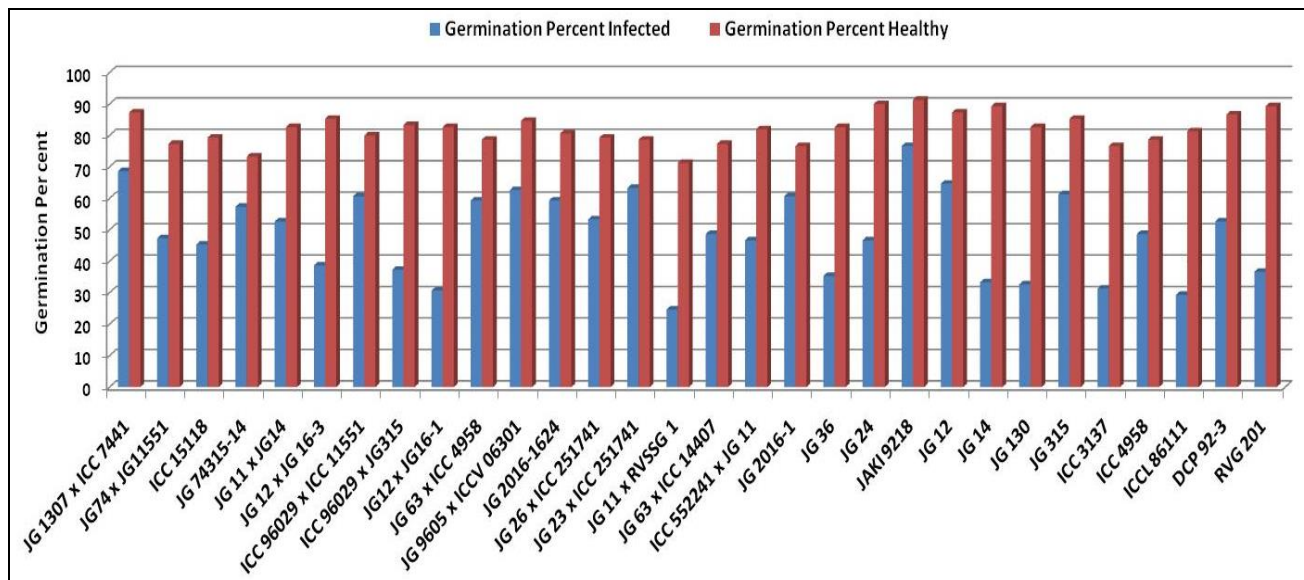


Fig 1: Germination percent of healthy and infested seed of different genotypes/varieties of chickpea

The present study revealed that the seed germination was affected due to damage of *C. chinensis*. Among all the genotypes, the healthy seeds of JG 11 x RVSSG 1 and JAKI 9218 were reported with germination of 71.33% (minimum) and 91.33% (maximum), while in the damaged seeds of the same cultivars, the germination was 24.67% (minimum) and 76.67% (maximum), respectively.

The results also coincide with the study of Parameshwarappa ^[2] *et al.* (2007) recorded ICCV-03311 genotype of chickpea with least loss in germination percent, Pokharkar and Chauhan ^[3] (2010) recorded kabuli variety with least germination percent (11.83%), Galav and Bhowmick ^[1] (2018) with germination percent highest in infested chickpea genotype DRRJ 2 X KAK 2 (61.00%) and lowest in JG 9605 (10.00%) respectively.

4. Conclusion

It was found that the seed germination was affected due to infestation of *C. chinensis*. Among all the varieties and genotypes, the healthy seeds of JG 11 x RVSSG 1 and JAKI 9218 were reported with germination of 71.33% (minimum) and 91.33% (maximum), while in the damaged seeds of the same cultivars, the germination was 24.67% (minimum) and 76.67% (maximum), respectively.

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