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Screening of different genotypes of isabgul against aphid, *Aphis gossypii* Glover

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Abstract
A field experiment was conducted during *rabi*, 2017-18 at Agronomy Instructional Farm of Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University Sardarkrushinagar, Randomized Block Design (RBD) with three replications and twelve genotypes *viz.*, JI 131, JI 159, JI 166, JI 174, JI 189, JI 221, JI 10-6, JI 10-7, JI 10-9, JI 10-10, GI 3, GI 4 genotypes/varieties of isabgul. Out of 12 genotypes/varieties of isabgul screened, three genotypes *viz.*, JI 10-7, JI 10-10 and JI 189 were found resistant against Isabgul aphid, whereas, genotypes *viz.*, JI 131, JI 10-6, GI 3, JI 10-9, JI 174, JI 166, JI 159, JI 221 and GI 4 were categorised as susceptible genotypes against aphid infestation. Genotypes JI 10-7 had recorded highest seed yield (963kgha^{-1}) of isabgul. It was followed by JI 189 (938kgha^{-1}) and JI 10-10 (923kgha^{-1}).

Keywords: Isabgul, Isbgul aphid, *Aphis gossypii* Glover, genotypes, resistant

Introduction
Isabgul (*Plantagoovata* Forsk.) is a medicinal plant that was originated from arid and semi-arid zones and is used widely in traditional and industrial pharmacology. It belongs to order plantagenets which consist of only a single family: Plantaginaceae. These species either are annual or perennial herbs. About 10 species of *Plantago* are recorded in India. *P. ovata* is only the cultivated species of the country because of its bold seed. Indian *P. ovata* is preferred over European *Plantagopsyllium* and *Plantagoindica* (Trease and Evans, 1978) [9]. *P. ovata* is known to be grown as wild in warmer and drier parts of the Mediterranean region of India. Seeds and husks of isabgul are also used widely in pharmacology as laxatives. Interest in isabgul has risen primarily due to its use in high fiber breakfast cereals and from claims that, it is effective in reducing cholesterol.
The seed husk is an age-old medicine in Ayurveda for the treatment of constipation. The husk derived from *P. ovata*, also referred to as isabgul or psylliummucilloid. The husk absorbs water, increases moisture content in stool and swells up to give increased bulk in intestine which leads to solve the problem of constipation.
The husk widely used as a tool bulking agent for the treatment of constipation. Its laxative effect has been attributed to its ability to form a gel in water. They are used as a demulcent and as a bulk laxative in the treatment of constipation, dysentery and other intestinal complaints, having a soothing and regulatory effect upon the system. Their regulatory effect on the digestive system means that they can also be used in the treatment of diarrhoea and irritation of haemorrhoids. The jelly-like mucilage produced when psyllium is soaked in water has the ability to absorb toxins within the large bowel. Thus, it helps to remove toxins from the body and can be used to reduce auto-toxicity. The seeds of isabgul are composed of different types of chemicals that are used as medicine. It contains mucilage, fatty oil, proteins, carbohydrates, mineral element, *etc*. Psyllium husk is obtained by milling the seeds which contains a high proportion of a hemicellulose that is composed of a xylan backbone linked with arabinose, rhamnose and galacturonic acid units.

Materials and Methods
A field experiment was carried out during *rabi*, 2017-18 at Agronomy Instructional Farm, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Randomized Block Design (RBD) with three replications and twelve genotypes JI 131, JI 159, JI 166, JI 174, JI 189, JI 221, JI 10-6, JI 10-7, JI 10-9, JI 10-10, GI 3, GI 4 is a genotypes of isabgul. The plot size 4.00m×1.50m with 30cm×10cm spacing.

Five plants from each plot were selected randomly and tagged to record the observations. Observations were recorded at weekly interval starting from one week after sowing till the maturity of the crop. The plots of these genotypes were kept free from insecticide application throughout the crop season.
Following aphid index given by Bank (1954) was fixed for estimating the population of aphid and the average aphid index was worked out by adopting following formula.

$$\text{Average aphid index} = \frac{0N + 1N + 2N + 3N + 4N}{\text{Total number of plants observed}}$$

Where, 0, 1, 2, 3, 4 are aphid index,
N = Number of plant showing respective aphid index.

Aphid index		Particulars
0	:	Plant free from aphid
1	:	Aphid present, but colonies did not build up. No injury due to pest apparent on the plant
2	:	Small colonies of aphid were present
3	:	Large colonies of aphid was present on tender parts and show damage symptoms due to aphids
4	:	Entire plant was covered by aphids

Cut-off value for each genotype was calculated applying formula proposed by Rana *et al*. (1975) [7].

Cut-off value = Mean-S.D.

On the basis of the formula, the genotype was categorized into resistant and susceptible designated as 'R' and 'S,' respectively.

Results and discussion

A field experiment was conducted at Agronomy Instructional Farm, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar during *rabi*, 2017-18 to study the relative susceptibility of different genotypes against isabgul aphid, *A. gossypii.*
Weekly observations were recorded throughout the crop season (Rana *et al.*, 1975) [7]. Perusal of the results presented in Table 1revealed that three genotypes *viz*., JI 10-7 (0.820 aphid index), JI 10-10 (0.842 aphid index) and JI 189 (0.846 aphid index) had categorised as Resistant genotypes ('r'). Further, it was also indicated from the results presented in Table 1 that nine genotypes *viz.*, JI 131 (0.852 aphid index), JI 10-6 (0.864 aphid index), GI 3 (0.892 aphid index), JI 10-9 (0.896 aphid index), JI 174 (0.921 aphid index), JI 166 (0.939 aphid index), JI 159 (0.945 aphid index), JI 221 (0.945 aphid index) and GI 4 (0.954 aphid index) were grouped into highly susceptible ones.

Table 1: Screening of different genotypes against aphid, *A. gossypii* infesting isabgul

Sr. No.	Genotypes	Average aphid index	Seed yield (kg/ha)
1	JI 131	0.852S	880^{abcd}
2	JI 159	0.945S	737^{cd}
3	JI 166	0.939S	697^{d}
4	JI 174	0.921S	897^{abc}
5	JI 189	0.846R	938^{ab}
6	JI 221	0.945S	918^{abc}
7	JI 10-6	0.864S	810^{abcd}
8	JI 10-7	0.820R	963^{a}
9	JI 10-9	0.896S	752^{bcd}
10	JI 10-10	0.842R	923^{abc}
11	GI 3	0.892S	830^{abcd}
12	GI 4	0.954S	777^{abcd}
Mean		0.893	58.43
S.D.		0.047	171
Cut-off value = Mean - S.D.		0.846	12.00

Resistant genotypes considered as 'R' and remaining were designated as susceptible 'S'. Treatment means with the letter/letters in common are not significant by DNMRT at 5 per cent level of significance.

Out of 12 genotypes/varieties of isabgul, three genotypes *viz.*, JI 10-7, JI 10-10 and JI 189 were found resistant against isabgul aphid, whereas, remaining genotypes *viz.*, JI 131, JI 10-6, GI 3, JI 10-9, JI 174, JI 166, JI 159, JI 221 and GI 4 were found susceptible genotypes. A total of twelve genotypes/varieties along with two varieties were screened for their seed yield of isabgul and the data are presented in Table 1 Among them, JI 10-7 had obtained (963kgha^{-1}) seed yield of isabgul. It was followed by JI 189 (938kgha^{-1}), JI10-10 (923kgha^{-1}), JI 221 (918kgha^{-1}), JI 174 (897kgha^{-1}), JI 131 (880kgha^{-1}), GI 3 (830kgha^{-1}), JI 10-6 (810kgha^{-1}), GI 4 (777kgha^{-1}), JI 10-9 (752kgha^{-1}), JI 159 (737kgha^{-1}) and JI 166 (697kgha^{-1}).
The susceptibility of genotypes to aphid, *A. gossypii* infesting isabgul was studied by various research workers *viz.*, Bariya (2008) [2], Jakhar and Chaudhary (2013) [3], Phulse (2013) [6], Shaikh *et al.* (2013) [8], Manivannan *et al.* (2017) [4] as well as Patel and Korat (2017) observed that the varieties/genotypes evaluated under the study were in order of susceptibility to aphid incidence as: Gujarat Isabgul 3>Gujarat Isabgul 1>Gujarat Isabgul 2>Niharika>Anand early-10>Kachchh local.

Conclusion

Out of 12 genotypes/varieties of isabgul, three genotypes *viz.*, JI 10-7, JI 10-10 and JI 189 were found resistant against aphid, whereas, remaining genotypes *viz.*, JI 131, JI 10-6, GI 3, JI 10-9, JI 174, JI 166, JI 159, JI 221 and GI 4 were found as susceptible genotypes.
Out of 12 genotypes/varieties of isabgul screened, JI 10-7 had obtained (963kgha^{-1}). It was followed by *viz.*, JI 189 (938kgha^{-1}), JI 10-10 (923kgha^{-1}), JI 221 (918kgha^{-1}), JI 174 (897kgha^{-1}), JI 131 (880kgha^{-1}), GI 3 (830kgha^{-1}), JI 10-6 (810kgha^{-1}), GI 4 (777kgha^{-1}), JI 10-9 (752kgha^{-1}), JI 159 (737kgha^{-1}) and JI 166 (697kgha^{-1}).

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