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Varietal screening of cotton against sucking insect pests at Dera Ismail Khan Khyber Pakhtunkhwa

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ABSTRACT

The study was performed at the Agricultural Research Institute D.I. Khan, during 2020 in a Randomized Complete Block Design. The study focused on screening different commercially available cotton varieties against sucking insect pests of cotton *viz.,* whiteflies, jassids and thrips. Significant differences (P≤0.05) among various tested cultivars were observed. Results showed that whiteflies and jassids appear during '2 July' and reach their peak during '27 August' while pest population was decline during '27 September' and after '27 September' the pest disappears from the field. Similarly, thrips appear during '2 July' and reach their peak during '4 September' while pest population decline during '27 September' and finally disappear from the field after '27 September'. Furthermore, the highest population of sucking pest plant^{-1} was recorded by CRIS-129 as followed by Cemb, Mubarak, Lalazar, Gomal 93, Bogdad and SLH-8 while lowest population was recorded from Israr Shaheed. However, the cultivar Mubarak produced maximum length and width (6.86 and 8.26 mm) while minimum length and width (4.36 and 4.76 mm) were recorded by Gomal 93. Similarly, Israr Shaheed performed in boll size (3.16 cm^2). Thus, Israr Shaheed recommended as the most suitable commercial cotton cultivars for agro-climatic conditions of D.I. Khan.

Keywords: *A. gossypii, A. biguttula biguttula, Gossypium hirsutum, T. tabaci.*

INTRODUCTION: Cotton (*Gossypium hirsutum* L) is major cash crops in both tropical and warm temperate regions of the world including Pakistan. It is the best for foreign exchange and the most important commercial fiber crop in the world. Pakistan ranks 4th in cotton production in the world. In Pakistan, Punjab and Sindh are famous for cotton production. While in KP it is grown in Southern district DI Khan (Khan *et al.*, 2010). Total production of the cotton crop for 2020-21 declined 23 per cent to 7 million bales from 9.15 million bales a year earlier. According to estimates of cotton crop sowing area released by Crop Reporting Service Department Punjab, the cultivated area in Punjab was recorded at 1.546 million hectares which comprises 96.6% of the proposed target of 1.60 million hectares and about 18.6% less than previous year. The sowing area in Sindh was registered at 0.615 million hectares which comprises 96.1% of the target showing an increase of 2.7% over last year. In KPK, Cotton crop was cultivated over an area of 0.000216 million hectares that is 2.2% of the set target whereas, the area sown in Balochistan was 0.057 million hectares as against the target of 0.06 million hectares showing target achievement of 95% (GOP, 2020). As compared to world leading cotton producing countries like USA and China the yield of cotton in Pakistan is low due to several factors i.e. due to lack of knowledge about cotton cultivation, lack of advanced technologies, lack of cultural practices, low marketing and poor socio-economic condition of cotton growers, poor quality seed, low seed rate, agronomic practices, application, imbalanced fertilizer, weed infestation and insect attack are main causes of its low yield (Hussain, 2002). The breeders in Pakistan, have focused to grow resistant varieties, the effect of various morphological plant characters and host selection to decline a numbers of insect pest attaching on cotton. The average losses, low yield, and magnitude of insect pests play an important role in damaging the cotton crops that started from sowing up to maturity. The severe attack on cotton of insect pests causes heavy qualities and quantities losses 40 to 50 % and 5 to 10 % losses cause by insect pest. Among the sucking insect pests, the most important pests are whitefly, jassids, and thrips are the key pests causing 50 % reduction in boll production and act as a vector of leaf curl virus disease (CLCV). The assessment of crop varieties' susceptibility or resistance plays an important role in the identification and monitoring of pest invasions, as well as in the selection of suitable crop breeds. Pest invasion levels across diverse varieties within a specific crop species serve as indicators of their resistance levels. Additionally, agronomic traits and biochemical compositions significantly influence both pest invasions and the overall yield and quality of crops. These factors bear considerable importance in the identification and selection of resistant varieties for effective management strategies. In the context of Pakistan's cotton production, the cultivation of resistant varieties stands as a pivotal determinant of success. Hence, this study involved the comprehensive evaluation of eight cotton cultivars, examining their relative resistance to aphids, jassids, and thrips, while also analyzing several associated characteristics.

OBJECTIVE: The present study was focused to screen different commercially available cotton varieties against sucking insect pests of cotton including, whitefly, jassids and thrips and determine their yield.

MATERIAL AND METHODS: The response of different cotton varieties against sucking insect pests was carried out at Agriculture Research Institute, Ratta Kulachi, District Dera Ismail Khan, Khyber Pakhtunkhwa during 2022. Cotton seeds were obtained from Agriculture Research Institute Ratta Kulachi station Dera Ismail Khan. Eight cotton varieties namely Gomal 93, Lalazar, Cemb, Mubarak, Bogdad, CRIS-129, SLH-8 and Israr Shaheed were sown in well prepared field separately. Plot size was 3×9 m^2, row to row distance was 30 cm and plant to plant distance was kept 75 cm. Experiment was carried out in Randomized Complete Block Design (RCBD) with three replications. Uniform agronomic practices, fertilizer, irrigation, hoeing, and weeding were carried out. While no preventive measure was applied for pest control. Data for sucking insect pests were recorded on weekly basis from pest arrival till crop maturity.

Population trend of different sucking insect pests: Whitefly, thrips, and jassids population were recorded on top, middle and bottom of randomly selected five plants from each variety on weekly basis early in the morning and thus the mean pest population was calculated.

Leaf area (cm^2): Leaf area was measured with the help of measuring tap by randomly selected five leaves from each variety.

Cotton boll size (cm^2): Mature cotton boll size was measured through Vernier caliper by randomly selected five plants of eight different varieties with three replications.

Cotton yield (kgha^{-1}): The yield of cotton was measured through electric balance of each variety with seeds and without seeds. The obtained yield was than calculated to kg/ha with the following formula Yield kg ha^{-1}=yield obtained /plot size m^2 ×10000.

Statistical analysis: Data recorded on different parameters was subjected to ANOVA and means was separated by using LSD test at P. 0.05 % level of probability.

RESULTS AND DISCUSSIONS: Population trend of Whitefly: Table 1 shows that whitefly appears during '2 July' where the maximum population was recorded from variety CRIS-129 (68.66 plant^{-1}) as followed by Cemb (66.66 plant^{-1}), Mubarak (66.66 plant^{-1}), Lalazar (65.33 plant^{-1}), Gomal 93 (65.00 plant^{-1}), Bogdad (63.40 plant^{-1}) and SLH-8 (63.23 plant^{-1}) whereas minimum population was recorded from Israr Shaheed (63.19 plant^{-1}). Similarly, peak duration of the pest was recorded '27 August' whereas variety CRIS-129 (81.40 plant^{-1}) remains most effected as followed by Cemb (80.00 plant^{-1}), Mubarak (80.00 plant^{-1}), Lalazar (75.00 plant^{-1}), Gomal 93 (71.33 plant^{-1}), Bogdad (67.56 plant^{-1}) and SLH-8 (65.66 plant^{-1}) whereas minimum population was recorded from Israr Shaheed (67.13 plant^{-1}). Finally, the decline was noticed during '27 September' where CRIS-129 (42.33 plant^{-1}) still most effected as followed by Cemb (40.66 plant^{-1}), Mubarak (40.66 plant^{-1}), Lalazar

(61.55 plant^{-1}), Gomal 93 (39.65 plant^{-1}), Bogdad (31.63 plant^{-1}) and SLH-8 (31.36 plant^{-1}) whereas minimum population was recorded from Israr Shaheed (31.14 plant^{-1}) and after '27 September the pest was disappear from the field. Overall mean maximum population was recorded on CRIS-129 (66.63 plant^{-1}) as followed by Cemb (65.35 plant^{-1}), Mubarak (65.35 plant^{-1}), Lalazar (61.55 plant^{-1}), Gomal 93 (60.91 plant^{-1}), Bogdad (57.50 plant^{-1}) and SLH-8 (57.27 plant^{-1}) whereas minimum population was recorded from Israr Shaheed (57.12 plant^{-1}).

Population trend of Jassids: Similarly, it is further evident from table 2. Jassids appears in the filed during '2 July' where the maximum population was recorded from variety CRIS-129 (21.80) as followed by Lalazar (21.40), Cemb (21.13), Mubarak (20.50), Bogdad (20.13), Gomal 93 (19.73) and SLH-8 (18.73) whereas minimum population was recorded from Israr Shaheed (15.00). Similarly, peak duration of the pest was recorded '27 August' whereas variety CRIS-129 (28.66) remains most effected as followed by Mubarak (29.50), Cemb (28.00), Lalazar (27.33), Gomal 93 (26.46), SLH-8 (25.93) and Bogdad (24.73) whereas minimum population was recorded from Israr Shaheed (22.80). Finally, decline was recorded during '27 September' where CRIS-129 (16.73) still most effected as followed by Mubarak (16.66), Cemb (16.62), Lalazar (15.59), Bogdad (15.51), Gomal 93 (15.44), and SLH-8 (14.89) whereas minimum population was recorded from Israr Shaheed (11.59). The overall mean maximum population was recorded on CRIS-129 (22.46) as followed by Cemb (22.25), Mubarak (22.01), Lalazar (21.56), Gomal 93 (21.08), Bogdad (20.69) and SLH-8 (20.54) whereas minimum population was recorded from Israr Shaheed (16.72).

Population trend of thrips: Table 3 shows the population trend of cotton thrips. During the study period, thrips were appearing in the filed from '2 July' where the maximum population was recorded from variety CRIS-129 (18.66) as followed by Cemb (16.66), Mubarak (16.66), Lalazar (15.33), Gomal 93 (15.00), Bogdad (13.40) and Israr Shaheed (13.33) whereas minimum population was recorded from SLH-8 (13.23). Similarly, peak duration of the pest was recorded '4 September' whereas variety CRIS-129 (28.66) remains most effected as followed by Mubarak (30.33), Cemb (30.33), Lalazar (25.33), Gomal 93 (21.33), Bogdad (16.46) and SLH-8 (16.10) whereas minimum population was recorded from Israr Shaheed (15.96). Finally, decline was recorded during '27 September' where CRIS-129 (23.00) showed maximum infestation level as followed by Mubarak (22.66), Cemb (22.66), Lalazar (17.33), Gomal 93 (14.66), Bogdad (6.43), and SLH-8 (5.86) whereas minimum population was recorded from Israr Shaheed (5.26). The overall mean maximum population was recorded on CRIS-129 (25.09) as followed by Cemb (24.09), Mubarak (24.09), Lalazar (19.94), Gomal 93 (17.83), Bogdad (13.77) and SLH-8 (13.48) whereas minimum population was recorded from Israr Shaheed (13.29). These research findings are partially accord with Kulkarni and Sharma (2004). Afi and Aheer (2007), had conducted trials examining different cotton genotypes to assess their resistance or tolerance to sucking insect pest. However, none of these studies specifically evaluated the current selection of cotton cultivars for their insect resistance. The current research findings align closely with Rote and Puri (1991), whose recorded similar response.. Findings of present research were partially supported findings of Khan and Ullah (1994). However insignificant differences might be because of differences in materials and methods. These interpretations are supported with preceding work of Hussain (2002). Similarly, Khan and Ullah (1994) also showed a negative relation between relative humidity and rainfall and the population trend of *Thrips tabaci* and *Tetranychus urticae.* Whereas in mid of June *T. tabaci*, *A. gossypii* and *A. biguttula biguttula* were appeared while *C. trifurcate* was appeared in August and *D. koenigii* in September. However, some other earlier research experiments were also stated that *B. tabaci* appeared in mid of June and reach its peak in August (Abro *et al.*, 2004; Godhani *et al.*, 2009; Hanumantharaya *et al.*, 2010).

Varieties	2/7/ 2020	9/7/ 2020	16/7/ 2020	29/7/ 2020	6/8/ 2020	13/8/ 2020	20/8/ 2020	27/8/ 2020	4/9/ 2020	13/9/ 2020	20/9/ 2020	27/9/ 2020	Mean
Gomal 93	65.00^{bc}	65.76^{ab}	66.36^{ab}	66.80^{ab}	67.33^{bc}	68.66^{bc}	68,93^{bc}	71.33^{b}	57.33^{ab}	51.01^{abc}	45.98^{ab}	39.65^{ab}	60.91a^{b}
Lalazar	65.33^{b}	66.00 ^{ab}	67.36^{ab}	68.13^{ab}	69.10^{abc}	70.33^{abc}	72.33^{abc}	75.00^{ab}	56.37^{ab}	49.14^{abc}	43.11^{ab}	36.33^{ab}	61.55^{ab}
Cemb	66.66^{b}	68.33^{a}	71.00^{a}	72.03^{a}	73.43^{ab}	74.66^{ab}	70.00^{ab}	80.00^{a}	59.99^{a}	53.03^{ab}	47.44^{a}	40.66^{a}	65.35^{a}
Mubarak	66.66^{b}	68.33^{a}	71.00^{a}	72.03^{a}	73.43^{ab}	74.66^{ab}	77.00^{ab}	80.00^{a}	59.99^{a}	53.03^{ab}	47.44^{ab}	40.66^{a}	65.35^{a}
Bogdad	63.40^{cd}	63.83^{b}	64.06^{b}	64.83^{b}	65.13^{c}	65.63^{c}	65.96^{c}	67.56^{b}	53.07^{b}	45.81^{bc}	39.13^{b}	31.63^{b}	57.50^{b}
CRIS-129	68.66^{a}	69.86^{a}	71.80^{a}	72.66^{a}	74.66^{a}	76.33^{a}	78.86^{a}	81.40^{a}	60.76^{a}	53.66^{a}	48.66^{a}	42.33^{a}	66.63^{a}
SLH-8	63.23^{cd}	63.56^{b}	64.00^{b}	64.50^{b}	64.93^{c}	65.36^{c}	65.66^{c}	67.33^{b}	52.99^{b}	45.48^{c}	38.91^{b}	31.36^{b}	57.27^{b}
Israr Shaheed	63.19^{d}	63.09^{b}	63.92^{b}	64.15^{b}	64.61^{c}	64.95^{c}	65.30^{c}	67.13^{b}	53.06^{b}	45.34^{c}	38.73^{b}	31.14^{b}	57.12^{b}
LSD $_{(0.05)}$	1.87	4.37	6.29	7.27	7.40	7.87	7.90	8.17	6.20	7.37	8.06	8.53	6.53

Table 1: Population trend of whiteflies recorded on different cotton varieties during cotton growing season. Mean in columns followed by the same letters are non-significant at 5% level of probability.

Varieties	2/7/ 2020	9/7/ 2020	16/7/ 2020	29/7/ 2020	6/8/ 2020	13/8/ 2020	20/8/ 2020	27/8/ 2020	4/9/ 2020	13/9/ 2020	20/9/ 2020	27/9/ 2020	Mean
Gomal 93	19.73^{cd}	21.13^{ab}	21.96^{a}	22.86^{a}	23.43^{a}	24.50^{a}	25.50^{ab}	26.46^{abc}	18.14^{ab}	16.96^{a}	16.84^{a}	15.44^{a}	21.08^{a}
Lalazar	21.40^{ab}	21.86^{ab}	22.43^{a}	22.93^{a}	23/.63^{a}	24.93^{a}	25.33^{ab}	27.33^{abc}	18.89^{ab}	17.40^{a}	16.92^{a}	15.59^{a}	21.56^{a}
Cemb	21.13^{abc}	22.13^{a}	22.96^{a}	23.90^{a}	24.53^{a}	25.83^{a}	26.83^{ab}	28.00^{ab}	19.15^{a}	17.96^{a}	17.88^{a}	16.62^{a}	22.25^{a}
Mubarak	20.50^{abc}	21.70^{ab}	21.66^{a}	23.63^{a}	24.66^{a}	25.23^{a}	27.60^{a}	29.50^{a}	18.70^{ab}	16.68^{a}	17.62^{a}	16.66^{a}	22.01^{a}
Bogdad	20.13^{bcd}	21.33^{ab}	21.46^{a}	22.53^{a}	23.53^{a}	23.86^{a}	24.26^{b}	24.73^{cd}	18.15^{ab}	16.47^{a}	16.51^{a}	15.51^{a}	20.69^{a}
CRIS-129	21.80^{a}	22.43^{a}	23.16^{a}	23.86^{a}	24.76^{a}	25.96^{a}	26.76^{ab}	28.66^{ab}	19.45^{a}	18.14^{a}	17.84^{a}	16.73^{a}	22.46^{a}
SLH-8	18.73^{d}	20.66^{b}	21.60^{a}	22.46^{a}	22.86^{a}	23.83^{a}	24.83^{ab}	25.93^{bc}	17.66^{b}	16.58^{a}	16.43^{a}	14.89^{a}	20.54^{a}
Israr Shaheed	15.00^{e}	16.10^{c}	17.23^{b}	18.63^{b}	19.60^{b}	20.43^{b}	21.33^{c}	22.80^{d}	13.11^{c}	12.22^{b}	12.62^{b}	11.59^{b}	16.72^{b}
LSD $_{(0.05)}$	1.65	1.44	1.78	2.10	2.32	2.24	2.57	2.80	1.45	1.77	2.09	2.32	1.97

Table 2: Population trend of jassids recorded on different cotton varieties during cotton growing season. Mean in columns followed by the same letters are non-significant at 5% level of probability

Varieties	2/7/ 2020	9/7/ 2020	16/7/ 2020	29/7/ 2020	6/8/ 2020	13/8/ 2020	20/8/ 2020	27/8/ 2020	4/9/ 2020	13/9/ 2020	20/9/ 2020	27/9/ 2020	Mean
Gomal 93	15.00^{bc}	15.76^{ab}	16.36^{ab}	16.80^{abc}	16.80^{abc}	17.33^{ab}	18.66a^{b}	20.33^{bc}	21.33^{bc}	18.66^{bc}	17.66^{bc}	14.66^{ab}	17.83^{bc}
Lalazar	15.33^{b}	16.00^{ab}	17.36^{ab}	18.13^{abc}	18.13^{abc}	19.10^{ab}	20.33a^{b}	22.33^{abc}	25.33^{ab}	22.33^{ab}	20.66^{ab}	17.33^{a}	19.94^{abc}
Cemb	16.66^{b}	18.33^{a}	21.00^{a}	22.03^{ab}	22.03^{ab}	23.43^{a}	24.66^{a}	27.00^{ab}	30.33^{a}	27.00^{a}	26.00^{ab}	22.66^{a}	24.09^{ab}
Mubarak	16.66^{b}	18.33^{a}	21.00^{a}	22.03^{ab}	22.03^{ab}	23.43^{a}	24.66^{a}	27.00^{ab}	30.33^{a}	27.00^{a}	26.00^{ab}	22.66^{a}	24.09^{ab}
Bogdad	13.40^{c}	13.83^{b}	14.06^{b}	14.83^{bc}	14.83^{bc}	15.13^{b}	15.63^{b}	15.96^{c}	16.46^{c}	12.00^{c}	9.96^{c}	6.43^{bc}	13.77^{c}
CRIS-129	18.66^{a}	19.86^{a}	21.80^{a}	22.66^{a}	22.66^{a}	24.66^{a}	26.33^{a}	28.86^{a}	30.33^{a}	27.13^{a}	26.46^{a}	23.00^{a}	25.09^{a}
SLH-8	13.23^{c}	13.56^{b}	14.00^{b}	14.50^{c}	14.50^{c}	14.93^{b}	15.36^{b}	15.66^{c}	16.10^{c}	11.63^{c}	9.63^{c}	5.86^{c}	13.48^{c}
Israr Shaheed	13.33^{c}	13.20^{b}	14.06^{b}	14.33^{c}	14.33^{c}	14.76^{b}	15.13^{b}	15.30^{c}	15.96^{c}	11.53^{c}	9.46^{c}	5.26^{c}	13.29^{c}
LSD $_{(0.05)}$	1.87	4.37	6.29	7.27	7.40	7.56	7.87	8.17	8.04	7.70	8.71	8.56	6.94

Table 3: Population trend of thrips recorded on different cotton varieties during cotton growing season. Mean in columns followed by the same letters are non-significant at 5% level of probability.

The present research findings are also aligning by Hanumantharaya *et al.* (2010) and Godhani *et al.* (2009) had also reported population of *A. gossypii* throughout the cotton growth period. Abro *et al.* (2004) had also reported the highest *A. biguttula biguttula* population in the August last week.

Mean leaf area (cm^2): There are different cotton varieties to compare it with each other that which one played a vital performance. Among all the different tested varieties, the highest leaf length was recorded by Mubarak (6.86 cm^2) followed by Bogdad (6.23cm^2), SLH-8 (5.40 cm^2), Israr Shaheed (5.40 cm^2), CRIS-129 (5.03 cm^2), Lalazar and Cemb (4.63 and 4.46 cm^2) respectively, while lowest length was observed by Gomal 93 (4.36 cm^2). The highest width of cotton cultivar was also recorded by Mubarak (8.26 cm^2) followed by CRIS-129 (6.90 cm^2), SLH-8 (6.73 cm^2), Israr

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Shaheed (6.70 cm^2), Bogdad (5.76 cm^2) and Lalazar (5.40 cm^2) while the lowest leaf width was recorded by Cemb and Gomal (4.76 cm^2) (table 4). There is no such previous work that has been done related to this parameter, that's why we are unable to compare it.

Cotton Varieties	Leaf area (cm^2)	
	Length	Width
Gomal 93	4.36^{f}	4.76^{e}
Lalazar	4.63^{e}	5.40^{d}
Cemb	4.46^{f}	4.76^{e}
Mubarak	6.86^{a}	8.26^{a}
Bogdad	6.23^{b}	5.76^{c}
CRIS-129	5.03^{d}	6.90^{b}
SLH-8	5.40^{c}	6.73^{b}
IsrarShaheed	5.40^{c}	6.70^{b}
LSD $_{(0.05)}$	0.12	0.22

Table 4: Mean leaf area (cm2) of different cotton varieties. Mean in columns followed by the same letters are non-significant at 5% level of probability.

Mean cotton boll size (cm^2) of different cotton varieties: Table 5 showed cotton boll size of different cultivars. Where the maximum boll size was recorded by Israr Shaheed cultivar (3.16 cm^2) as followed by CRIS-129 (2.86 cm^2), Mubarak (2.76 cm^2), Cemb (2.73 cm^2), Lalazar (2.70 cm^2), Gomal 93 and Bogdad (2.66 cm^2) while minimum cotton boll size was observed by SLH-8 (2.53 cm^2) cotton cultivar. These results are in consonance with Shah *et al.* (1993) who reported that the number of bolls $plant^{-1}$ differ significantly among different varieties. These results are confirmed by Shah *et al.* (1993) who reported that the average mature boll weight was affected significantly due to different varieties.

Cotton Varieties	Cotton boll size (cm^2)
Gomal 93	2.66^{cd}
Lalazar	2.70^{c}
Cemb	2.73^{bc}
Mubarak	2.76^{bc}
Bogdad	2.66^{cd}
CRIS-129	2.86^{b}
SLH-8	2.53^{d}
IsrarShaheed	3.16^{a}
$LSD_{(0.05)}$	0.15

Table 5: Mean cotton boll size (cm2) of different cotton varieties. Mean in columns followed by the same letters are non-significant at 5% level of probability.

Cotton yield (with seeds and without seed): Cotton cultivars showed significant differences in ha^{-1} cotton yield (table 6).

Cotton Varieties	Cotton yield (kg ha^{-1})	
	With seed	Without seed
Gomal 93	1023.3^{h}	1123.3^{h}
Lalazar	1296.7^{b}	1423.3^{b}
Cemb	1283.3^{c}	1396.7^{c}
Mubarak	1203.3^{d}	1313.3^{d}
Bogdad	1143.3^{e}	1243.3^{e}
CRIS-129	1133.3^{f}	1233.3^{f}
SLH-8	1023.3^{h}	1147.3^{g}
Israr Shaheed	1403.3^{a}	1513.3^{a}
LSD $_{(0.05)}$	3.57	4.42

Table 6: Table 6: Yield of tested cotton varieties with seed and without seed cotton yield. Mean in columns followed by the same letters are non-significant at 5% level of probability.

Due to its tolerance to sucking pests Israr Shaheed showed highest with seed and without seed cotton yield (1513.3 and (1403.3 kg ha^{-1}) as followed by Gomal 93 (1423.3 and 1300 kg ha^{-1}), Bogdad (1343 and 1230 kg ha^{-1}), Cemb (1251 and 1150 kg ha^{-1}), CRIS-129 (1168.7 and 1053.3 kg ha^{-1}) and SLH-8 (1111 and 1050 kg ha^{-1}) while minimum yield was recorded by Lalazar (1126.7 and 1030 kg ha^{-1}). The findings of the current study underscore a pronounced variability in seed cotton yield associated with different cultivars, indicating a likely influence of genetic factors on this observed diversity. This outcome aligns with the research conducted by Baloch *et al.* (2014), who similarly noted highly significant differences in seed cotton yield among various cultivars. The present study's results are consistent with the research findings of (Baloch and Veesar, 2007), all of whom documented variations in seed cotton yield across different cultivars. Furthermore, our findings echo those of Sahito *et al.* (2016), emphasizing a significant positive correlation between seed cotton yield and various quantitative and qualitative traits in upland cotton cultivars. This collective body of evidence not only reaffirms the intricate interplay of genetic factors in determining cotton yield but also highlights the consistency of these patterns across diverse studies, contributing to the cumulative knowledge base in the field of cotton cultivation.

CONCLUSIONS: It is concluded that whiteflies and jassids appear during '2 July' and reach their peak during '27 August' while pest population was decline during '27 September' and after '27 September' the pest disappears from the field. Similarly, thrips appear during '2 July' and reach their peak during '4 September' while pest population decline during '27 September' and finally disappear from the field after '27 September'. Thus, Israr Shaheed recommended as the most suitable commercial cotton cultivars for agro-climatic conditions of D.I. Khan.

CONFLICT OF INTEREST: Authors have no conflict of interest

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