

The impact of sowing dates and varieties on the incidence of *Oxycarenus laetus* and *Dysdercus koingii* on cotton

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Abstract

Dusky bug (*Oxycarenus laetus*) and red cotton bugs (*Dysdercus koingii*) are commonly known as seed bugs because they feed on cotton seed. They have become major threat to cotton in Pakistan since last two years. The present studies were therefore planned to find out the role of sowing dates in cotton pest population. The dusky and red cotton bug population varied considerably with respect to date of sowing. The results revealed that invasion of both bugs was significantly more in case of early sowing (up to 15 red cotton bug/plant & 25 dusky bugs/boll) than in normal and late sowing (8 to 10 red cotton bugs & 10 to 12 dusky bug/boll respectively). Sampling dates exhibited that population of cotton bugs (dusky and red cotton bug) was higher during first week of October followed by mid September, 2013, whereas lower in late sowing. Varietal comparison depicted that FH-118 and FH-142 showed non significant difference for red and dusky cotton bug population. The results further explained that peak population of red cotton bug was recorded during the month of October, 2013.

Keywords: cultural practices, dusky bug, pest status, red cotton bug, sowing date

O impacto da época de semeadura e das variedades na incidência de *Oxycarenus laetus* e *Dysdercus koingii* sobre algodão

Resumo

Oxycarenus laetus e *Dysdercus koingii* são comumente conhecidos como erros de sementes porque se alimentam de sementes de algodão. Eles tornaram-se grande ameaça para o algodão no Paquistão nos últimos dois anos. No presente estudo foram, realizados para descobrir o papel do período de semeadura na população da praga do algodão. A população das pragas variou consideravelmente em relação a data da sementeira. Os resultados revelaram que a invasão de ambos os insetos foi significativamente maior em caso de semeadura precoce (até 15 *Dysdercus koingii* / planta e 25 *Oxycarenus laetus* / capulho) do que na semeadura normal e tardia (8 a 10 *Dysdercus koingii* e 10-12 *Oxycarenus laetus* / capulho respectivamente). Datas de amostragem apresentaram que a população de insetos de algodão foi maior durante a primeira semana de outubro, seguidos de meados de setembro de 2013, enquanto a mais baixa em semeadura tardia. Comparação Varietal retratado que FH-118 e FH-142 demonstrou nenhuma diferença significativa para a população de insetos. Os resultados explicam ainda que o pico da população de *Dysdercus koingii* foi atingido durante o mês de outubro de 2013.

Palavras-chave: práticas culturais, inseto obscuro, status de praga, Praga do algodão vermelho, época de semeadura

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Introduction:

Both biotic and abiotic factors influences differently to all crops thus are major threats to agriculture and food security (Farooq et al., 2011). During last two years in Pakistan two seed bugs naming dusky and red cotton bug significantly affected seed cotton resulting in poor quality lint and seed thus considered to be an alarming threat in coming years. These bugs are also known as lint strainers. Cultural practices are an important part of integrated pest management strategies (Reynolds et al., 1975, Summy & King 1992). Plant population, sowing dates, nutrients, water management and plant protection practices are the key factors involved in getting a profitable yield (Ali et al., 2005). Optimum sowing time is considered to be an important factor ensuring yield and managing arthropod pests of the crop (Showler et al., 2005). Therefore planting dates affect not only yield, but also the population infestation of insect pest.

Planting date studies against insect pest have been conducted in various areas of the world and many researchers concluded research on this aspect against variety of insect pest (Porter et al., 1996; Smith 1990, Mann et al., 1997). Showler *et al.* (2005) conducted an experiment regarding the effect of sowing dates on the population of boll weevils, they concluded that squares damage of boll weevils were 44-56% more abundant in later planted treatments than in the earlier planted treatments.

By altering the planting time, crop may be protected from insect pest attack due to plant escape or breakage of feeding and breeding link for insect pest population and use of insecticides can be reduced. Norman & Sparks (1998) indicated that a short season production system made use of insecticide applications unnecessary. The effect of planting dates on red and dusky bug has not yet been investigated. Present set of experiment was designed to ascertain the suitable planting time to keep the pest incidence under check.

Materials and Methods:

The present studies were carried out at experimental area of Cotton Research Institute, Faisalabad, Pakistan during 2012-13. Purpose of

present findings was to investigate peak density periods of the pests for future studies. Seeds of FH-118 and FH-142 were sown on 9 different sowing dates starting from February 16, 2012 to June, 16 2012 with 15 days interval, on beds with plot size of 5.25m × 1.5m. The field was ploughed to a depth of 30cm and then large soil crumbs broken prior to planting. The experiment was conducted following split plot design with three replications. All agronomic practices were adopted except that crop was remained unsprayed. The observations on the population of red cotton bug were made from 5 randomly selected plants in each replication, whereas that of dusky bug were counted from 5 squares each of 5 different plants/plot at 15 days interval i.e. from 15-7-2012 to 15-9-2012.

Statistical analysis:

The data was subjected to two-way analysis of variance (ANOVA) using MSTAT-C statistical program at $p = 0.05$. Significant treatment means were separated using the least significant difference (LSD) at $p = 0.05$ level.

Results:

The dusky and red cotton bug population varied significantly with change in dates of sowing, however infestation level of bugs was significantly more in early sowing than normal and late sowing. The results further revealed that population build up of pest remained abundant on cotton sown from 15th February till 1st April, but relatively less on 15th April to 15th June plantings (Fig.1&2).

Effect of planting dates on population build up of Red cotton bug:

Sampling dates showed that initial population of red cotton bug was 0.57 that steadily increased and reached to its peak 18.36/plant at first date of sowing, whereas in second date of sowing initial population of red cotton bug was recorded 0.4 that steadily increased and reached to its peak 17.00/plant during 2nd week of September (Table-1).

Similarly initial population of red cotton bug on mid March sowing (3rd sowing date) was recorded 0.1 that steadily increased and

reached to its peak 13.70/plant during the 1st of October. Like wise, initial population of red cotton bug on first April sowing (4th sowing date) was recorded 3.03 that steadily increased and reached to its peak 13.23/plant during the 2nd

of September, whereas initial population of red cotton bug on mid April sowing (5th sowing date) was recorded 2.83 that steadily increased and reached to its peak 11.43/plant during the 1st of October (Table-1).

Table1.Red cotton bug population on different sampling dates from (1-7-2012 to 15-9-2012)

Sr. No.	Sowing/planting dates	Sampling dates					
		1/7	15/7	1/8	15/8	1/9	15/9
1	□D1=15/2	0.57A	4.96A	6.16A	7.50A	18.36A	17.8A
2	D2=1/3	0.4A	3.70B	4.50AB	6.56AB	17.00A	14.50AB
3	D3=15/3	0.1A	3.67B	2.1BC	3.60ABC	11.67AB	13.7AB
4	D4=1/4	0.0B	3.03BC	3.46ABC	2.86BC	13.23AB	13.20AB
5	D5=15/4	0.0B	2.83BCD	1.13BC	2.63BC	10.53AB	11.43AB
6	D6=1/5	0.0B	2.33CDE	1.33BC	2.73BC	9.50AB	10.96AB
7	D7=15/5	0.0B	1.80DEF	0.60C	3.80ABC	9.20AB	8.70B
8	D8=1/6	0.0B	1.67EF	1.27BC	1.16C	8.30AB	10.33AB
9	D9=15/6	0.0B	1.00F	0.66C	0.53C	4.57B	10.43AB
-	LSD (0.05)	1.3	1.15	3.70	4.19	12.47	8.70

In six date of sowing (first May) initial population of red cotton bug was recorded 2.33 that steadily increased and reached to its peak 10.96/plant during 1st week of October. Like wise, 7th sowing date possessed initial population of red cotton bug 1.80 per plant that steadily increased and reached to its peak 9.20/plant during 2nd week of September. Initial population of red cotton bug on 8th date of sowing (first June) was recorded 1.67/plant that increased and reached to its peak stage 10.33/plant during the 1st week of October, whereas 9th date of sowing possessed initial level of red cotton bug 1.00/plant that reached to its highest level 10.33/plant

on 1st week of October (Table-1).

Effect of sampling dates on dusky bug on cotton:

Sampling dates showed that initial population of dusky bug was 6.0 that steadily increased and reached to its peak 26.4/boll in first date of sowing. In second date of sowing initial population of dusky bug was recorded 3.7/boll that steadily increased and reached to its peak 24.5/boll during 1st week of October, however initial population of dusky bug on mid March sowing (3rd sowing date) was recorded 4.5/boll that steadily increased and reached to its peak 20.8/boll during the 1st week of October (Table-2).

Table2.Dusky bug population on different sampling dates from (15-7-2012 to 15-9-2012)

Sr. No.	Sowing/planting dates	Sampling dates					
		1/7	15/7	1/8	15/8	1/9	15/9
1	D1=15/2	6.0A	15.4A	17.7A	13.5A	20.2A	26.4A
2	D2=1/3	3.7AB	13.9A	17.7A	12.9AB	16.9AB	24.5AB
3	D3=15/3	4.5AB	10.9A	13.7AB	9.2ABC	15.8ABC	20.8ABC
4	D4=1/4	5.2ABC	9.8A	13.8AB	10.0ABC	10.9BCD	18.9ABC
5	D5=15/4	3.9ABC	10.0A	13.8AB	9.9ABC	12.8BCD	14.4BC
6	D6=1/5	2.8ABC	9.8AB	15.5AB	8.17ABC	12.1BCD	13.7BC
7	D7=15/5	1.3BCD	8.6AB	13.7AB	6.5C	9.4CD	15.4ABC
8	D8=1/6	2.2CD	8.7AB	12.1AB	8.1ABC	10.5BCD	13.6BC
9	D9=15/6	1.0D	2.0B	10.3B	7.1BC	8.6D	9.9C
-	LSD (0.05)	7.6	7.8	5.7	6.3	6.8	11.0

Results revealed that initial population of dusky bug on first April sowing (4th sowing date) was recorded 5.2/boll that steadily increased and reached to its peak 18.9/boll during the 1st week of October, whereas initial population of

dusky bug on mid April sowing (5th sowing date) was recorded 3.9/boll that steadily increased and reached to its peak 14.4/boll during the 1st week of October (Table-2).

In six date of sowing (first May) initial

population of dusky bug was recorded 2.8/boll that steadily increased and reached to its peak 13.7/boll during 1st week of October, however 7th sowing date initial population of dusky bug was recorded 1.3/boll that steadily increased and reached to its peak 15.4/boll during 1st week of October. In 8th date of sowing (first June) initial population of dusky bug was recorded 2.2/boll that increased and reached to its peak stage 13.6/boll on 1st week of October, whereas 9th date of sowing possessed initial level of dusky

bug 1.00/boll that reached to its highest level 9.9/ boll on 1st week of October, that was the least population as compared with other sowing dates (Table-2).

Effect of cotton cultivars on red cotton bug and dusky bug on cotton:

Varieties FH-118 and FH-142 on all sampling dates showed non significant difference for red cotton bug and dusky bug population (Fig.1&2) and Peak density of red cotton and dusky cotton bugs on per plant basis is given in Fig 3 &4.

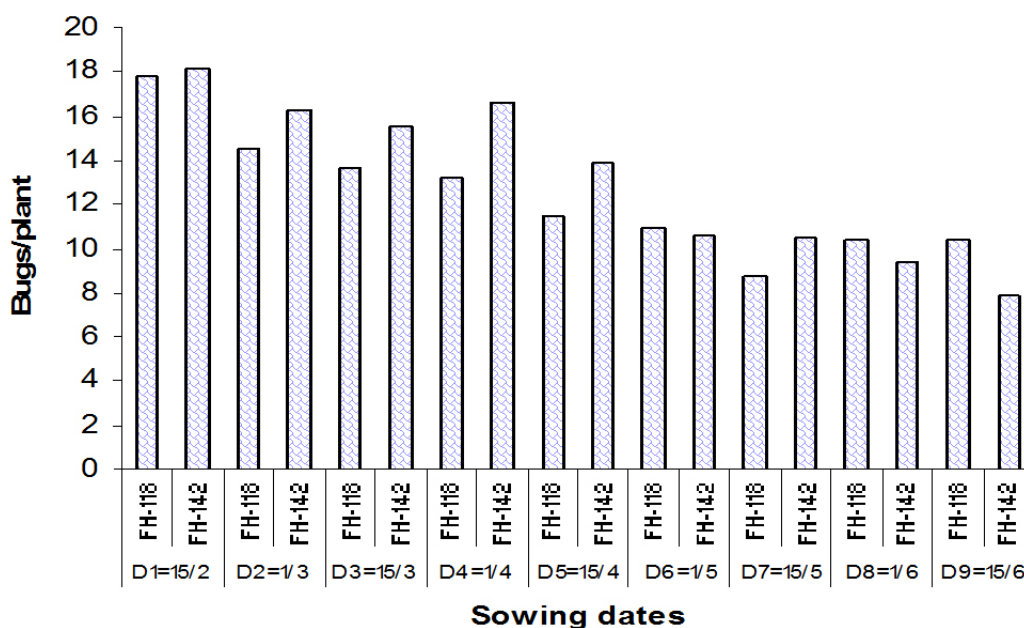


Figure1. Mean number of red cotton bugs per plant basis in nine planting dates on two transgenic cultivars of cotton (FH-142 and FH-118) during 2012

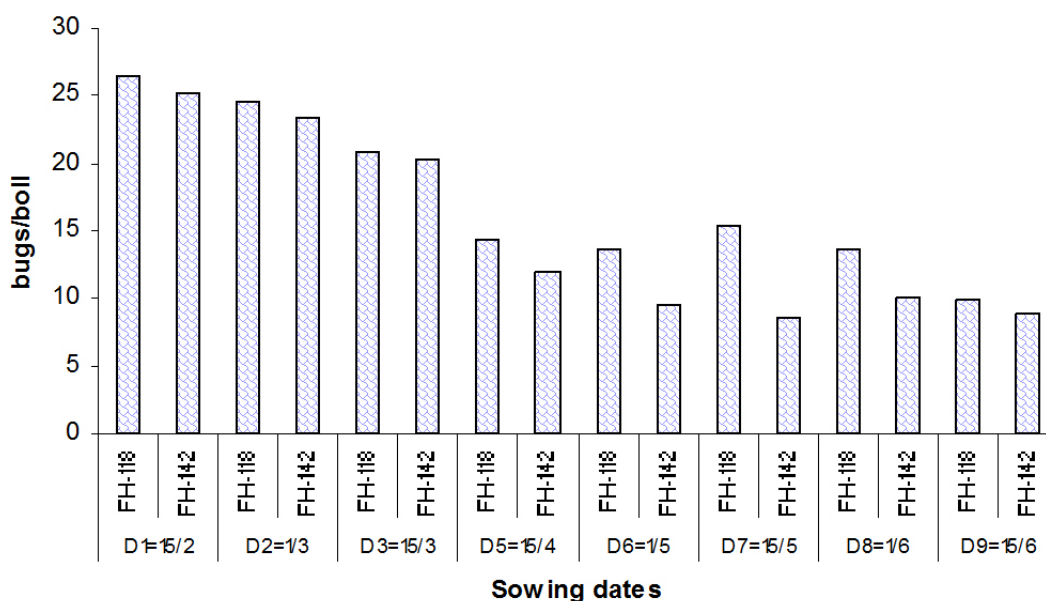


Figure2. Mean number of dusky cotton bugs per boll basis in nine planting dates on two transgenic cultivars of cotton (FH-142 and FH-118) during 2012

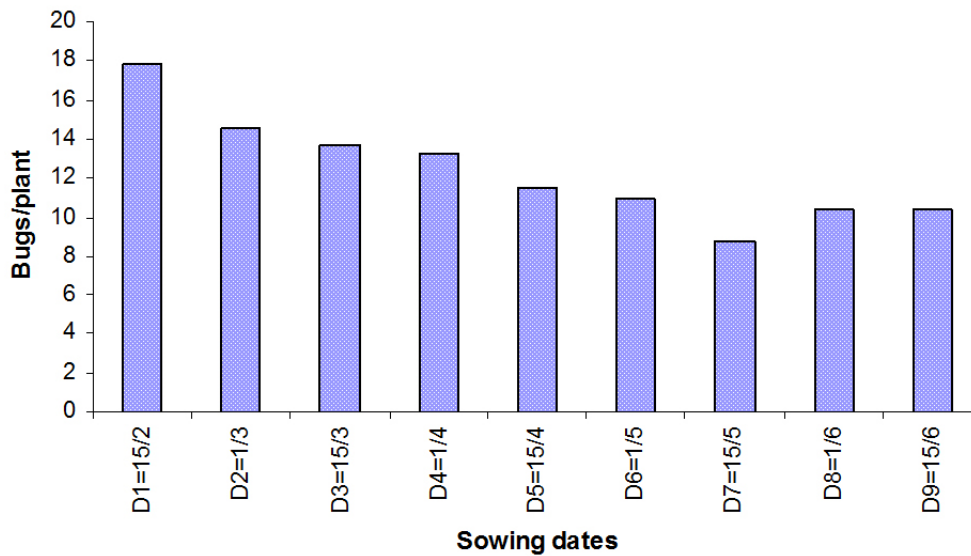


Figure3. Peak density of red cotton bugs per plant basis among nine planting dates recorded on different sampling dates during 2012

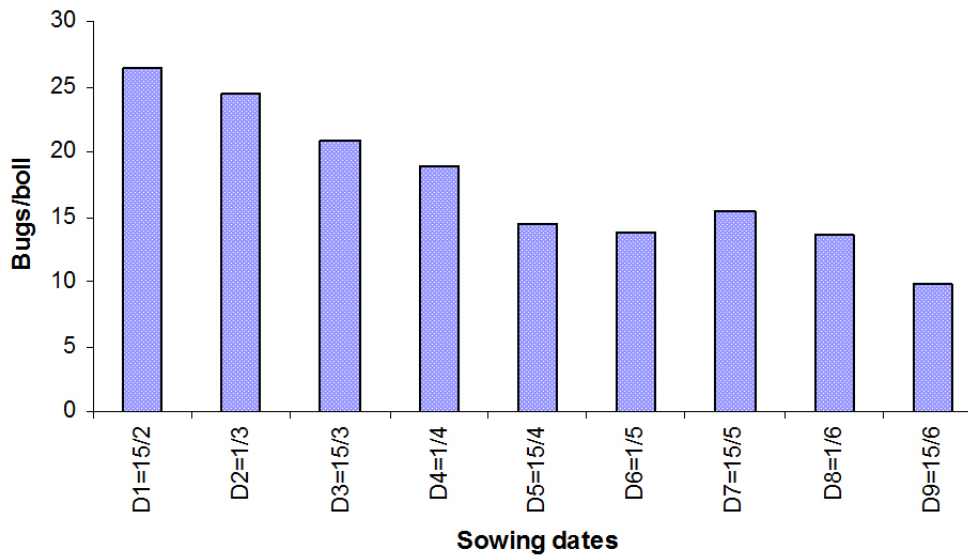


Figure4. Peak density of dusky bugs per boll basis among nine planting dates recorded on different sampling dates during 2012

Discussion

Early and late crop plantation had significant effect on insect pest incidence and productivity of the crop. Based on the results of present study it was found that population build up of both red cotton bug and dusky bug varied with respect to sowing dates. However early sown crop was more severely attacked by red and dusky cotton bugs compared to normal and late sowing. Maximum population was recorded on February and March sown cotton as compared to all other sowing dates. McPherson et al. (2001) also determined that early planted soybeans have higher populations of stink bugs during mid-season than soybeans

planted at the usual planting date in Georgia. However, soybeans planted in the conventional system experience higher populations later in the season, and those populations are much higher than the populations that occur on the earlier planted soybeans (McPherson et al., 2001). Those results are contradictory to the findings of Karavina, et al. (2012) who studied the effect of sowing dates on the population of aphid, jassid and boll worms population and reported that the pest populations increased from early planted (20th October) to the later planted (17th November and 15th December) cotton that may be due to variability of pest, climatic conditions and its requirement for food.

Like wise based on the results of present study higher population of red cotton bug and dusky bug may be due to the easy provision of feeding and breeding link for the bugs on early sown cotton. So the early sown cotton served as carry over for the red and dusky bug. Abbas et al. 2010 also reported the variety of host plants that provided food for the mealy bug and served as carry over for the pest. Similarly (Todd 1989) reported that stink bugs move from one to other non cultivated hosts (i.e., *Cassia* spp. and *Crotalaria* spp.) when cultivated hosts plants such as corn, *Zea mays* L., and Soybean are near to senescence, in this way they provide feeding link for the pest. However movement of stink bugs from one host to another coincides with the phenological stages of those hosts. Stink bugs will feed on most plant structures; however, seeds or fruit are preferred (Panizzi, 1997). Consequently, stink bugs migrate from hosts that are near senescence to hosts with seeds or fruit present for feeding and oviposition (Rolston & Kendrick, 1961).

Further the results revealed that the peak incidence of red and dusky bug occurred during the month of September and October that may be due to the favorable climatic conditions for the pest, because temperature plays key role on population build up of pest. Early sowing of crop support the diapausing insect pests to flourish that in turn shift to the major crop and go on multiplying there through out the season. Karavina et al. 2012 studied the effect of variety and planting dates on the incidence of bollworms and sucking insect pests of Cotton (*Gossypium hirsutum* L.), he revealed that there was a significant increase in aphid, jassid and bollworm infestation because pests migrated from the early-planted crop to the later planted crop.

Further based on the results of present findings the early sowing of crop breaks the chance of plant escape for the pest because crop remains in the field for a longer duration and there is no disruption in the life cycle and development of the pest.

Conclusion

Based on insect pest population attributes, we should discourage early planting

of crop because insect pest after breaking diapause after post hibernating stage feed on our major crop, multiply there and cause economic damage to our produce, therefore there should be breakage of feeding and breeding linked in order to manage the insect pest in a sustainable way.

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