

Original Research Article

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Effect of Intercropping on the Incidence of Gram Pod Borer, *Helicoverpa armigera* in Chickpea

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ABSTRACT

An experiment with randomized complete block design including three replications and nine treatments was carried out in investigation field of Sam Higginbottom University of Agriculture and Technology Science, to compare various combinations of chickpea intercropping. Among all the intercrop and chloropyriphos treatments, lowest per cent pod damage was recorded in chloropyriphos treatment with 4.83 and it was followed by chickpea + marigold, chickpea + mustard, chickpea + coriander and chickpea + linseed with 10.24, 12.49, 14.64 and 16.77 per cent pod damage respectively. Chickpea sole was found with highest pod damage per cent. Data on intercropped chickpea equivalent yield revealed that, the highest yield was recorded in chloropyriphos treated treatment of 19.48 q ha⁻¹, Followed by Chickpea + Marigold, Chickpea + Wheat, Chickpea + Coriander and Chickpea + Mustard with 19.13, 16.55, 16.43 and 15.52 q ha⁻¹ respectively. Chickpea sole was recorded with 14.28 q ha⁻¹. The highest cost benefit ratio was recorded in chloropyriphos, Followed by Chickpea intercropped with Coriander, Marigold, Mustard and Lentil. Among the all treatment highest cost benefit ratio was recorded in Chickpea + Coriander (1:2.93), followed by lowest Chickpea + Wheat (1:2.22). All treatments are significant.

Keywords

Chickpea, Gram
Pod Borer,
Intercrops and
Seasonal incidence.

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Introduction

In Uttar Pradesh, the *H. armigera* causes serious damage to the crop during fruiting stage and is considered to be a major limiting factor for the production of chickpea. Single larvae may destroy several pods before reaching to maturity and this pest is reported to damage 5 to 40 per cent pods of chickpea crop during different year (Chauhan and Dahiya, 1994). The moth begins ovipositing on chickpea at the seedling stage but this behavior is checked by the adverse climatic and geographical conditions (Tahhan *et al.*, 1982). The caterpillars feed on flowers if suitable vegetation is not available (Patel and

Koshiya, 1999). It attacks more than 180 cultivated species from cereals, legumes, vegetables, fruits, forage and wild species (Jat and Ameta, 2013).

Crop pest surveillance and its monitoring aids in successful pest management strategies. It enables the growers to get prepared for necessary management measures taken against the pest. Intercropping is an ideal cropping for insect pest management at no additional cost. It acts as a preventive measure against build-up of insect pest population and is compatible with other

methods of pest control and free from environmental pollution problems. It has considerable impact on egg laying, larval population, larval parasitisation and pod damage (Kumar *et al.*, 2008).

Intercropping can affect microclimate of the agro ecosystem and ultimately produce an unfavourable environment for the pest. So, present research was carried on these objectives.

Materials and Methods

Evaluation of intercrops for the management of gram pod borer in chickpea was carried out during *rabi* 2016-17 at agriculture research farm, SHUATS, Allahabad. Chickpea cultivar Radhey was intercropped with marigold (3:1), coriander (5:1), pea (3:1), wheat (3:1), mustard (3:1), linseed (3:1), lentil (3:1), chloropyriphos and chickpea sole.

The experiment was laid out in randomised block design with plot size of 2 x 2 m. At harvest, pod damage per cent was worked out, grain yield, chickpea equivalent yield and economics were recorded treatment wise after threshing the pods.

Results and Discussion

To evaluate the different intercrops on percentage pod damage, grain yield and equivalent yield

The data on the pod damage per cent revealed that all the intercrop treatments and chloropyriphos treatment were significantly superior over the chickpea sole crop.

Among all the intercrop treatments and chloropyriphos treatment, lowest per cent pod damage was recorded in chloropyriphos treatment with 4.83 and found among and it was followed by chickpea + marigold,

chickpea + mustard, chickpea + coriander and chickpea + linseed with 10.24, 12.49, 14.64 and 16.77 per cent pod damage respectively. The next best treatments were, chickpea + lentil (19.90) and chickpea + wheat with 20.58 and 21.63 per cent pod damage respectively and they were found at par with each other.

Intercropping chickpea + pea was found insignificant for the management of gram pod borer. Chickpea sole was found to be predominantly affected by highest pod damage per cent compared to other treatments with 32.44 per cent (Table 1).

Data on grain yield revealed that, the highest grain yield was recorded in chloropyriphos treated treatment of 19.48 q ha⁻¹. Followed by Chickpea + Marigold (14.71 + 4.42 q ha⁻¹), Chickpea + Coriander (13.42 + 3.01 q ha⁻¹) and Chickpea + Mustard (13.42 + 2.10 q ha⁻¹).

The next best yields were recorded by the following treatments Chickpea + linseed (11.88 + 2.42 q ha⁻¹), Chickpea + Wheat (10.57 + 5.98 q ha⁻¹) and Chickpea + Lentil (10.24 + 4.98 q ha⁻¹). Chickpea + Pea (9.54 + 0.32 q ha⁻¹) intercrop was found with lower yield. Chickpea sole was recorded with 14.28 q ha⁻¹.

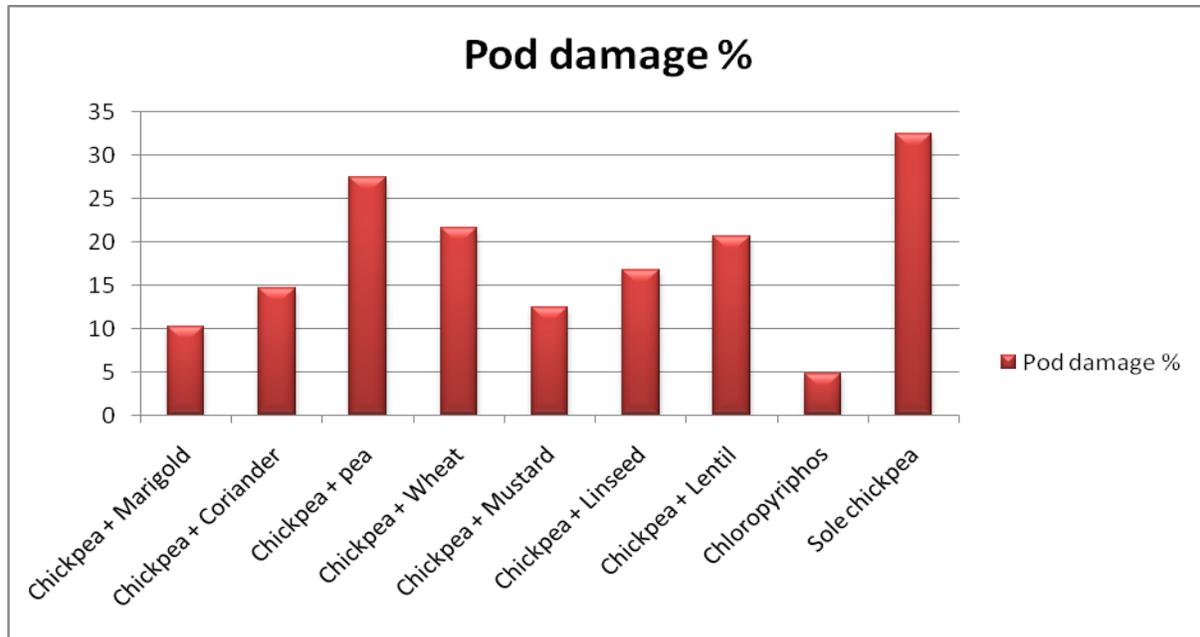
Data on intercropped chickpea equivalent yield revealed that, the highest grain yield was recorded in chloropyriphos treated treatment of 19.48 q ha⁻¹. Followed by Chickpea + Marigold, Chickpea + Wheat, Chickpea + Coriander and Chickpea + Mustard with 19.13, 16.55, 16.43 and 15.52 q ha⁻¹. The next best yields were recorded by the following treatments *i.e.* Chickpea + lentil and Chickpea + Linseed with 15.22 and 14.30 q ha⁻¹. Chickpea + Pea intercropped treatment found with least yield compared to others with 10.85 q ha⁻¹. Chickpea sole was recorded with 14.28 q ha⁻¹ (Table 2).

Table.1 To evaluate the different intercrops on percentage pod damage, grain yield and equivalent yield

S.No	T. No.	Treatments	Pod damage %	Grain yield	Chickpea equivalent yield (CEY) (qha ⁻¹)
1.	T ₁	Chickpea + Marigold	10.24	14.71+4.42	19.13
2.	T ₂	Chickpea + Coriander	14.64	13.42+3.01	16.43
3.	T ₃	Chickpea + pea	27.38	8.28+2.57	10.85
4.	T ₄	Chickpea + Wheat	21.63	10.57+5.98	16.55
5.	T ₅	Chickpea + Mustard	12.49	13.42+2.10	15.52
6.	T ₆	Chickpea + Linseed	16.77	11.88+2.42	14.30
7.	T ₇	Chickpea + Lentil	20.58	10.24+4.98	15.22
8.	T ₈	Chloropyriphos	04.83	19.48	19.48
9.	T ₉	Sole chickpea	32.44	14.28	14.28
F test			S	S	S
SeD			0.35	0.15	0.62
CD			0.75	0.31	1.33

Table.2 Economics of chickpea pod borer management using different treatments

Sr. No.	Treatment	Total cost of seed or treatment	Common cost	Total cost	Gross returns	C:B ratio
01	Chickpea + Marigold	3640	23248	26888	77970	1:2.89
02	Chickpea + Coriander	3950	23248	27198	79742	1:2.93
03	Chickpea + pea	7200	23248	30448	45255	1:1.48
04	Chickpea + Wheat	4850	23248	28098	62418	1:2.22
05	Chickpea + Mustard	3675	23248	26923	74450	1:2.76
06	Chickpea + Linseed	3922	23248	27170	70653	1:2.60
07	Chickpea + Lentil	3915	23248	27163	72116	1:2.65
08	Chloropyriphos	6575	23248	29823	97400	1:3.26
09	Chickpea sole	4800	23248	28048	71400	1:2.54



Data on intercropped chickpea equivalent yield revealed that, the highest cost benefit ratio was recorded in chlorpyriphos treated treatment of 3.26. Followed by Chickpea + Coriander, Chickpea + Marigold, Chickpea + Mustard and Chickpea + Lentil with 2.93, 2.89, 2.76 and 2.65. The next best yields were recorded by the following treatments *i.e.* Chickpea + linseed and Chickpea sole with 2.60 and 2.54. Chickpea + Wheat and Chickpea + Pea intercropped treatment found with cost benefit ratio compared to Chickpea sole with 2.22 and 1.48. Chickpea + Pea were found uneconomical among the treatments.

Effectiveness of chlorpyriphos was higher than the other insecticides in reducing pod damage and recorded significantly higher good pods per plant and it was reported by Gowada *et al.*, (2007). The effectiveness of chlorpyriphos was significantly superior in all treatment, reported by Balasubramanian *et al.*, (2001), Gowada *et al.*, (2007), Shahzad *et al.*, (2003) and Shah *et al.*, (2003). Yadav (1989) and Kumar *et al.*, (2008) mixed crop with marigold and coriander found reduced gram pod borer population and per cent pod damage. The other authors also supported our

present investigation that chickpea intercropped with mustard or linseed has been observed with reduced gram pod borer damage Lal *et al.*, (1985), Yadav, (1989), Singh (2014) and Yadav, (1987). Chickpea + marigold were recorded with maximum yield which was at par with the Chickpea + coriander by Tripathi *et al.*, (2008).

Hossain *et al.*, (2010) revealed that, chickpea intercropped with mustard was most economic module for the management of gram pod borer with early sowing as, marigold used as trap crop reducing the egg laying of gram pod borer in tomato which was reported by Srinivasan *et al.*, (1994).

Hanumantharaya *et al.*, (2007) and Turker *et al.*, (2000) reported that intercropping also increases the natural enemies on gram pod borer than compared to sole crop. Reena *et al.*, (2009) also concluded that gram pod borer population can be effectively managed by intercropping with mustard, coriander and linseed. Certain findings of our present investigation were similar with Pankaj *et al.*, 2008 and Gughal *et al.*, 2013.

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