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Effect of conserved natural enemies on pest infestation in lablab bean (*Lablab purpureus* L.) by using border crops

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Abstract
The research project entitled "Pest management in Lablab bean (*Lablab purpureus* L.) by using border crops" was undertaken at Agronomy Farm, College of Agriculture, Dapoli during *rabi* 2016-17. The pooled percent reduction in aphid population over control was in the range of 52.01 to 61.23. The highest (61.23) reduction was observed in the treatment Sweet corn as flowering plant on bunds followed by Marigold (60.43), Safflower (57.46), Cowpea (56.87) and Mustard (56.05). The pooled percent reduction in number of holes made by leaf eating caterpillar over control was in the range of 57.25 to 72.35. The highest (72.25) reduction was observed in the treatment Sunflower as flowering plant on bunds followed by Coriander (67.74), Mustard (65.95), Sweet corn (64.67), Sesamum (64.16), Safflower (60.32), Cowpea (59.81) and Marigold (57.25).The pooled mean percent reduction in infestation of Pod borer in six weeks was in the range of 33.85 to 49.77. The highest (49.77%) reduction was observed in the treatment Sweet corn as a flowering plant on bunds followed by Sunflower (48.37%), Mustard (47.72%), Coriander (47.36%) and Marigold (46.15%).

Keywords: Lablab bean, border crops, pest infestation, natural enemies

Introduction
Lablab bean (*Lablab purpureus* L.) belongs to family leguminaceae is an annual herbaceous crop and commonly called as Dolichos bean, Hycinth bean, Indian bean, Country bean, Pavta, Auri, Butter bean, Field bean and Egyptian kidney bean. It is popularly recognized as "Wal" in Maharashtra state. It is one of the oldest vegetable crops grown as pod vegetable in the world and in India particular. It is a native of tropical Asia, probably India and from there it spread to tropical and subtropical countries of the world like China, Sudan, Egypt and other countries.
In India, the total area under pulses is 230.98 lakh hectares with an annual production of 17.20 million tonnes with yield 744 kg/hectare (Anonymous, 2015a), while in Maharashtra, the total area under pulses is 2977 thousand hectare with an annual production of 1805.9 thousand tonnes with yield 607 kg/ hectare (Anonymous, 2015b). In *Konkan*, the total area under pulses is 88,000 hectares with an annual production of 37 metric tonnes (Anonymous, 2015c).
As many as 55 species of insects and one mite feeding on the lablab bean crop from seedling stage till the harvest in Karnataka. Among the various pests, pod borer complex comprising of *Helicoverpa armigera* (Hubner), *Adisura atkinsoni* (Moore), *Maruca vitrata* (Geyer), *Etiella zinckenella* (Treitschke), *Exelastis atomosa* (Walshinghan), and *Lampides boeticus* (Linnaeus) are of considerable important causing 80 percent pod damage. Sucking pests like lablab bug *Coptosoma cribraria* (Fabricius), *Riptortus pedestris* (Fabricius), *Nazara viridula* (Linnaeus) and aphid *Aphis craccivora* occurred commonly and observed in large number throughout the cropping period (Govindan, 1974).
Aphids are one of the most serious pests of crops worldwide, causing major yield and economic losses. The management of these noxious pests is primarily based on synthetic insecticides due to their easy availability and applicability and their indiscriminate use has resulted in the development of insecticidal resistance in the pest, environmental pollution, resurgence of minor pests, pollution hazards and disruption on balance of eco-system. Border cropping is more economical method of pest management and has become popular, particularly among the small and marginal farmers and it is very well fitted in Bio intensive Pest Management. It is also very good practice for conservation of the natural enemies and pollinators.

Materials and Methods

The present investigation entitled "Pest management in Lablab bean (*Lablab purpureus* L.) by using border crops" was undertaken at Agronomy Farm, College of Agriculture, Dapoli during *rabi* 2016-2017 Tal. Dapoli, Dist. Ratnagiri (M.S.). The soil of the experimental site was lateritic, fairly homogeneous with medium drainage. The experimental plot was divided using Randomized Block Design having three replications. Whereas each replication was divided into nine subplots of size 3.6 × 3.6 m. The flat beds were prepared and used for cultivation of lablab bean. The required quantity of F.Y.M. was mixed at the time of field preparation and fertilizers were applied at the time of sowing. The healthy seed of 'Konkan Wal-1' variety of lablab bean was obtained from Department of Agronomy, College of Agriculture, Dapoli. The recommended seed rate of 30-45 kg ha^{-1} was used. Farm Yard Manure as organic manure at the rate of 5 tonnes ha^{-1} was applied in the soil before last harrowing so as to mix it well in the soil. Nitrogen and Phosphorus were applied in the form of straight fertilizers through Urea (46% N) and Single Super Phosphate (16% P_2O_5) to each plot. The recommended dose, 25:50:0 kg NPK ha^{-1} was applied at the time of sowing.

Treatment Plots

Tr. No.	Name of the plant	Botanical name	Family
T1	Marigold	*Tagetes patula* L.	Asteraceae
T2	Safflower	*Carthamus tinctorious* L.	Asteraceae
T3	Sweet corn	*Zea mays* L.	Graminae
T4	Sesamum	*Sesamum indicum* L.	Pedaliaceae
T5	Mustard	*Brassica juncea* L.	Crucifereae
T6	Coriander	*Coriandrum sativum*L.	Umbelliferae
T7	Cowpea	*Vigna unguiculata* L.	Leguminosae
T8	Sunflower	*Helianthusannus* L.	Asteraceae
T9	Control	-	-

Date of Sowing: 2nd Dec., 2016 and Date of harvesting: 5thApril, 2017

Five plants per plot were selected randomly to record the observations on the incidence of lablab bean pests and for recording the natural enemies in lablab bean ecosystem. Same lablab bean plants were used for recording the presence of different natural enemies. Similarly, five flowering plants on border were randomly selected for recording the natural enemies. The total of nine treatments having eight flowering plants on borders (mentioned in treatments details) and one control (No flowering plants *i.e.* open border) were used around the plot size of 3.6 x 3.6 m. The flowering plants were grown on the borders.

Effect of conserved natural enemies on pest infestation

Data on pest incidence recorded in different treatments was used to calculate percent reduction in infestation of different lablab bean pest over control to find out the effect of conserved natural enemies in lablab bean.

The percent reduction in pod borer infestation over control was calculated by using following formula;

$$\text{\% reduction in pest infestation} = \frac{100}{\text{\% pest infestation in control}} \text{ X } \text{\% infestation in treatment} - 100$$

The percent reduction in aphid and leaf eating caterpillar damage over control was calculated by using following formula;

$$\text{\% reduction in pest Incidence} = \frac{100}{\text{Pooled mean of control}} \text{ X } \text{Mean of treatment} - 100$$

Statistical analysis

Data on percent infestation of lablab bean pests was converted in arc sine transformation and then analyzed, whereas data on number of natural enemies was averaged and the standard deviation was calculated.

Table 1: Effect of different treatments on mean aphid population in per leaves per plant reduction over control

Treatment	Mean aphid population in per leaves per plant reduction over control												
	Week1 Jan. 1st wk	Week2 Jan. 2nd wk	Week3 Jan. 3rd wk	Week4 Jan. 4th wk	Week5 Jan. 5th wk	Week6 Feb. 1st wk	Week7 Feb. 2nd wk	Week8 Feb. 3rd wk	Week9 Feb. 4th wk	Week10 March 1st wk	Week11 March 2nd wk	Week12 March 3rd wk	Pooled mean of all 12 weeks
T1Marigold	23.03	41.47	63.11	61.00	64.96	61.41	53.33	72.53	80.85	73.02	73.49	54.00	60.43
T2 Safflower	-13.80	41.86	67.68	54.44	56.25	59.49	59.39	67.20	72.85	78.68	65.66	75.40	57.46
T3Sweet corn	13.05	51.07	68.44	54.63	48.00	56.51	47.58	69.33	75.71	77.32	82.56	83.15	61.23
T4 Sesamum	3.59	44.96	51.52	45.75	55.81	40.52	32.12	74.67	55.42	74.15	68.51	72.46	52.01
T5Mustard	12.54	37.98	59.60	47.87	52.01	71.86	57.58	56.27	68.28	75.51	76.34	49.99	56.05
T6 Coriander	13.31	34.69	35.82	63.70	58.71	65.46	51.21	67.20	61.99	64.63	69.40	75.67	54.55
T7 Cowpea	29.68	53.49	56.40	53.47	59.83	59.71	43.33	48.80	49.14	72.11	69.58	78.61	56.87
T8 Sunflower	20.21	59.30	59.14	57.91	51.12	42.01	32.12	61.33	64.85	77.78	61.21	52.93	54.28
T9 Control	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 2: Effect of different treatments number of holes made by leaf eating caterpillar per leaves per plant reduction over control

Treatment	Number of holes made by leaf eating caterpillar per leaves per plant reduction over control												
	Week1 Jan. 1st wk	Week2 Jan. 2nd wk	Week3 Jan. 3rd wk	Week4 Jan. 4th wk	Week5 Jan. 5th wk	Week6 Feb. 1st wk	Week7 Feb. 2nd wk	Week8 Feb. 3rd wk	Week 9 Feb. 4th wk	Week10 March 1st wk	Week11 March 2nd wk	Week12 March 3rd wk	Pooled mean of all 12 weeks
T1Marigold	48.48	45.08	56.93	61.26	54.76	54.91	84.25	74.94	60.2	72.60	83.33	100.00	57.25
T2Safflower	65.65	43.55	60.38	58.03	52.38	64.57	63.25	79.95	90.0	72.60	50.65	100.00	60.32
T3Sweet corn	48.48	72.54	50.04	62.87	71.43	58.13	84.25	79.95	100.0	72.60	74.94	100.00	64.67
T4Sesamum	59.41	51.18	63.82	56.42	71.43	61.35	63.25	84.96	100.0	100.00	54.74	100.00	64.16
T5Mustard	43.79	58.81	60.38	62.87	88.10	77.46	79.00	79.95	100.0	90.87	65.99	48.72	65.95

T_6 Coriander	53.16	54.23	53.49	77.40	80.95	77.46	84.25	84.96	70.1	100.00	56.02	48.72	67.74
T_7 Cowpea	51.60	52.71	56.93	66.10	76.19	64.57	68.50	14.79	100.0	72.60	56.27	100.00	59.81
T_8 Sunflower	60.97	51.18	77.61	75.79	73.81	87.12	84.25	84.96	80.1	100.00	44.25	100.00	72.35
T9 Control	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3: Effect of different treatments on per cent reduction in infestation of Pod borer, *Maruca vitrata* (Geyer) over control

Treatments	Per cent reduction in infestation of Pod borer over control						
	Week7 (Feb. 2nd week)	Week8 (Feb. 3rd week)	Week9 (March 4th week)	Week10 (March 1st week)	Week11 (March 2nd week)	Week12 (March 3rd week)	Pooled mean of all 6 weeks
T_1 Marigold	34.14	53.64	63.27	28.48	43.45	47.27	46.15
T_2 Safflower	25.22	49.86	56.89	35.08	45.34	38.76	43.04
T_3 Sweet corn	42.53	65.80	63.34	28.03	46.28	45.95	49.77
T_4 Sesamum	32.91	60.70	65.44	25.78	28.32	45.56	44.24
T_5 Mustard	45.93	58.75	70.56	22.69	39.01	43.56	47.72
T_6 Coriander	32.68	53.00	57.38	33.44	47.31	54.37	47.36
T_7 Cowpea	20.85	45.53	42.80	17.45	27.64	43.07	33.85
T_8 Sunflower	47.54	65.41	60.42	28.08	46.08	37.22	48.37
T9 Control	-	-			-	-	-

Results and Discussion

To study the effect of conserved natural enemies on pest infestation

Effect of different treatments on per cent reduction of aphids over control

Data on percent reduction of aphids per leaf per plant affected due to different treatments of flowering plants on bunds over control is presented in Table 1.

The data on effect of different treatments on percent reduction in aphid population revealed that in week 1 (1st week of January) it was in the range of –13.80 to 29.68. The treatment Cowpea (29.68) was found to be the best treatment in reducing the mean aphid population per leaf per plant by attracting the number of natural enemies towards the flowering plants. The next treatments in order were Marigold (23.03), Sunflower (20.21), Coriander (13.31) and Sweet corn (13.05). The percent reduction in week 2 (2nd week of January) was in the range of 34.69 to 59.30. The highest reduction (59.30) was observed in the treatment Sunflower followed by Cowpea (53.49), Sweet corn (51.07), Sesamum (44.96), Safflower (41.86) and Marigold (41.47). The percent reduction in aphid population in week 3 (3rd week of January) was in the range of 35.82 to 68.44. The highest reduction (68.44) was observed in the treatment Sweet corn. The next best treatments in order of efficacy were Safflower (67.68), Marigold (63.11), Mustard (56.60), Cowpea (56.40) and Sunflower (59.14). The percent reduction in week 4 (4th week of January) was in the range of 45.75 to 63.70. The highest reduction (63.70) was observed in the treatment Coriander. The next best treatments in order of efficacy were Marigold (61.00), Sunflower (57.91), Sweet corn (54.63), Safflower (54.44) and Mustard (47.87). The percent reduction in week 5 (5th week of January) was in the range of 48.00 to 64.96. The highest reduction (64.96) reduction was observed in the treatment Marigold followed by Cowpea (59.83), Coriander (58.71), Safflower (56.25), Sesamum (55.81) and Mustard (52.01). In the week 6 (1rd week of February) percent reduction was in the range of 42.01 to 71.86. The highest reduction of 71.86 was recorded from the treatment Mustard followed by Coriander (65.46), Marigold (61.41), Cowpea (59.71) and Safflower (59.49). In the week 7 (2nd week of February) the reduction in aphid population was in the range of 32.12 to 59.39. The highest reduction of 59.39 was recorded from the treatment Safflower followed by Mustard (57.58., Marigold (53.33), and Coriander (51.21). In the week 8 (3rd week of February) the percent reduction was in the range of 48.80 to 74.67. The highest reduction was recorded from the treatment Sesamum (74.67) followed by Marigold (72.53), Sweet corn (69.33), Safflower (67.20) and Coriander (67.20). In the week 9 (4th week of February) percent reduction of aphid population over control was in the range of 49.14 to 80.85. The highest reduction (80.85) was recorded from the treatment Marigold followed by Sweet corn (75.71), Safflower (72.85), Mustard (68.28), and Sunflower (64.85). In the week 10 (1st week of March) the percent reduction of aphid population per leaf per plant was in the range of 64.63 to 78.68. The highest reduction (78.68) was recorded from the treatment Safflower. The next best treatments in order were Sunflower (77.78), Sweet corn (77.32), Mustard (75.51) and Sesamum (74.15). In week 11 (2nd week of March) percent reduction was in the range of 61.21 to 82.56. The highest reduction (82.56) was recorded from the treatment Sweet corn. The next best treatments in order were Mustard (76.34), Marigold (73.49), Cowpea (59.58) and Coriander (69.40). In the week 12 (3rd week of March) percent reduction of aphid population over control was in the range of 52.93 to 83.15.

The highest reduction (83.15) was recorded from the treatment Sweet corn. The next best treatments in order were Cowpea (78.61), Coriander (75.67), Safflower (75.40) and Sesamum (72.46).

The pooled mean of percent reduction of aphid population over control of twelve weeks was calculated and presented in Table 1. The pooled percent reduction was in the range of 52.01 to 61.23. The highest (61.23) reduction was observed in the treatment Sweet corn as flowering plant on bunds followed by Marigold (60.43), Safflower (57.46), Cowpea (56.87) and Mustard (56.05).

The results of the present findings are corroborative with the findings of Amoros-Jimene *et al.* (2014). They reported that the provision of additional floral resources in the crop is a successful strategy of conservation biological control for attracting several natural enemies including predatory syrphids. Bari and Sardar (1998) studied the response of the predator, *M. sexmaculatus* [*Cheilomenes sexmaculata*], to control bean aphid, *Aphis craccivora*. The predation rate and controlling efficacy were based on the population of aphids in lablab plants. Five larvae of *C. sexmaculata* caused 73-95 percent suppression of infesting bean aphids at high densities (490-640) and 86-100% reduction at low densities (105-180) on caged bean plants in 7 days. *C. sexmaculata* larvae (10 or 15 individuals) were able to control 97 and 100 percent aphids at a density below 500 per plant.

Effect of different treatments on per cent reduction of holes made by leaf eating caterpillar, *S. litura* over control

Data on percent reduction of holes made by leaf eating caterpillar affected due to different treatments of flowering plants on bunds is presented in Table 2.

The data on percent reduction of holes in the week 1 (1st week of January) were in the range of 43.79 to 65.65. The treatment Safflower (65.65) was found to be the best treatment in reducing the holes followed by Sunflower (60.97), Sesamum (59.41), Coriander (53.16), Cowpea (51.60), Marigold (48.48) and Sweet corn (48.48). The percent reduction in week 2 (2nd week of January) was in the range of 43.55 to 72.54. The highest reduction (72.54) was observed in the treatment Sweet corn followed by Mustard (58.81), Coriander (54.23), Cowpea (52.71), Sesamum (51.18) and Sunflower (51.18). The percent reduction of holes made by leaf eating caterpillar in week 3 (3rd week of January) was in the range of 50.04 to 77.61. The highest reduction (77.61) was observed in the treatment Sunflower. The next best treatments in order were Sesamum (63.82), Safflower (60.38), Mustard (60.38), Cowpea (56.93) and Marigold (56.93). The percent reduction in week 4 (4th week of January) was in the range of 56.42 to 77.40. The highest reduction (77.40) was observed in the treatment Coriander followed by Sunflower (75.79), Cowpea (66.10), Mustard (62.87) Sweet corn (62.87), Marigold (61.26), Safflower (58.03) and Sesamum (56.42). The percent reduction in week 5 (5th week of January) was in the range of 52.38 TO 88.10. The highest reduction (64.96) was observed in the treatment Mustard. The next best treatments in order were Coriander (80.95), Cowpea (76.19), Sunflower (73.81) Sweet corn (71.43), Sesamum (71.43) and Marigold (54.76). In the week 6 (1rd week of February) the percent reduction of holes made by leaf eating caterpillar was in the range of 54.91 to 87.12. The highest reduction (87.12) was recorded from the treatment Sunflower followed by Mustard (77.46), Coriander (77.46), Safflower (64.57), Cowpea (64.57), Sesamum (61.35) and Sweet corn (58.13). In week 7 (2nd week of February) the percent reduction was in the range of 63.25 to 84.25. The highest reduction (84.25) was recorded from the treatment Marigold, Sunflower, Sweet corn and Coriander followed by Mustard (79.00), Cowpea (68.50), Sesamum (63.25) and Safflower (63.25). In the week 8 (3rd week of February) percent reduction of holes made by leaf eating caterpillar per leaf per plant was in the range of 14.76 to 84.96. The highest reduction (84.96) was recorded from the treatment Sesamum, Coriander and Sunflower followed by Mustard (79.95), Sweet corn (79.95), Safflower (79.95), Marigold (74.94) and Cowpea (14.79). The percent reduction of holes made by leaf eating caterpillar was in the range of 60.20 to 100.00 in the week 9 (4th week of February). The highest reduction (100.00) was recorded from the treatment Sweet corn, Sesamum, Mustard and Cowpea followed by Safflower (90.00), Sunflower (80.10), Coriander (70.10) and Marigold (60.20). In the week 10 (1st week of March) percent reduction was in the range of 72.60 to 100.00. The highest reduction (100.00) was recorded from the treatment Sesamum, Coriander and Sunflower. The next best treatments in order were Mustard (90.87), Marigold (72.60), Safflower (72.60), Sweet corn (72.60), and Cowpea (72.60). In week 11 (2nd week of March) the percent reduction was in the range of 44.25 to 83.33. The highest reduction (83.33) was recorded from the treatment Marigold followed by Sweet corn (74.94), Mustard (65.99), Cowpea (56.27), Coriander (56.02), Sesamum (54.74), Safflower (50.65) and Sunflower (44.25). In week 12 (3rd week of March) the percent reduction of holes made by leaf eating caterpillar per leaf per plant was in the range of 48.72 to 100.00. The highest reduction (100.00) was recorded from the treatment Marigold, Safflower Sweet corn, Sesamum, Cowpea and Sunflower. The next best treatments in order were Cowpea (48.72) and Coriander (48.72).

The pooled percent reduction of holes made by leaf eating caterpillar per leaf per plant of all twelve weeks is calculated and presented in Table 15 and depicted in Fig. 15. The pooled percent reduction was in the range of 57.25 to 72.35. The highest (72.25) reduction was observed in the treatment Sunflower as flowering plant on bunds followed by Coriander (67.74), Mustard (65.95), Sweet corn (64.67), Sesamum (64.16), Safflower (60.32), Cowpea (59.81) and Marigold (57.25).

The results of the present findings are more or less in conformity with the finding of Landis (2000). The habitat management, a form of conservation biological control, is an ecologically based approach aimed at favouring natural enemies and enhancing biological control in agricultural systems. The goal of habitat management is to create a suitable ecological infrastructure within the agricultural landscape to provide resources such as food for adult natural enemies, alternative prey or hosts, and shelter from adverse conditions.

Effect of different treatments on per cent reduction in infestation of Pod borer, *M. vitrata* over control

Data on percent reduction in infestation of Pod borer affected due to different treatments of flowering plants on bunds is presented in Table 3.

In the week 7 (2nd week of February) percent reduction in infestation of Pod borer was in the range of 20.85 to 47.54. The highest percent reduction in infestation of Pod borer (47.54) was from the treatment Sunflower followed by Mustard (45.93), Sweet corn (42.53), Marigold (34.14) and Sesamum (32.91). In the week 8 (3rd week of February) percent reduction in infestation of Pod borer was in the range of 45.53 to 65.80. The highest percent reduction in infestation of Pod borer (65.80) was recorded from the treatment Sweet corn followed by Sunflower (65.41), Sesamum (60.70), Mustard (58.75) and Coriander (53.00). In week 9 (4th week of February) percent reduction in infestation of Pod borer was in the range of 42.80 to 70.56. The highest percent reduction in infestation of Pod borer (70.56) was recorded from the treatment Mustard followed by Sesamum (65.44), Sweet corn (63.34), Marigold (63.27), and Sunflower (60.42). The percent reduction in infestation of Pod borer was in the range of 17.45 to 35.08 in week 10 (1st week of March). The highest percent reduction in infestation of Pod borer (35.08) was recorded from the treatment Safflower. The next best treatments in order were Coriander (33.44), Marigold (28.48), Sunflower (28.08) and Sweet corn (28.03). In week 11 (2nd week of March) percent reduction in infestation of Pod borer was in the range of 27.64 to 47.31. The highest percent reduction in infestation of Pod borer (47.31) was recorded from the treatment Coriander. The next best treatments in order were Sweet corn (46.28), Sunflower (46.08), Safflower (45.34) and Marigold (43.45). In week 12 (3rd week of March) percent reduction in infestation of Pod borer was in the range of 37.22 to 54.37. The highest percent reduction in infestation of Pod borer (54.37) was recorded from the treatment Coriander followed by Marigold (47.27), Sweet corn (45.95), Sesamum (45.56) and Mustard (43.56).

The pooled percent reduction in infestation of Pod borer of six weeks was calculated and presented in Table 3.

The pooled mean percent reduction in infestation of Pod borer in six weeks was in the range of 33.85 to 49.77. The highest (49.77%) reduction was observed in the treatment Sweet corn as a flowering plant on bunds followed by Sunflower (48.37%), Mustard (47.72%), Coriander (47.36%) and Marigold (46.15%).

The results of the present findings are more or less in conformity with the finding of Pattar *et al.* (2012). The results indicated that significantly lower pod damage was recorded in chickpea + sunflower intercropping system (19.50%) compared to sole chickpea. Sole chickpea recorded pod damage to an extent of 24.28 percent even after necessary prophylactic measures. Lower numbers of larvae were observed in chickpea + sunflower intercropping system. Similarly the population of spiders and coccinellids were higher in this intercropping system compared to sole chickpea.

Sharma *et al*. (2004) reported that maize with cowpea sown at the boundary of the chickpea field enhanced predator and parasitoid activities. Similarly, interspersed sowing of sorghum conserved beneficial insects and served as perches for insectivorous birds. Marigold was grown as trap crop for the management of chickpea pod borer.

Conclusion

The pooled percent reduction of mean aphid population per leaf per plant in twelve weeks was in the range of 52.01 to 61.23. The highest (61.23) reduction was observed in the treatment Sweet corn as flowering plant on bunds followed by Marigold (60.43), Safflower (57.46), Cowpea (56.87) and Mustard (56.05). The pooled percent reduction of mean holes made by leaf eating caterpillar per leaf plant in twelve weeks was in the range of 57.25 to 72.35. The highest (72.25) reduction was observed in the treatment Sunflower as flowering plant on bunds followed by Coriander (67.74), Mustard (65.95), Sweet corn (64.67), Sesamum (64.16), Safflower (60.32), Cowpea (59.81) and Marigold (57.25).

The pooled mean percent reduction in infestation of Pod borer in six weeks was in the range of 33.85 to 49.77. The highest (49.77%) reduction was observed in the treatment Sweet corn as a flowering plant on bunds followed by Sunflower (48.37%), Mustard (47.72%), Coriander (47.36%) and Marigold (46.15%). The flowering plants Sweet corn, Marigold, Safflower, Cowpea and Mustard on lablab bean bunds were proved best for reducing the mean aphid population per leaf per plant. Sunflower, Coriander, Mustard, Sweet corn and Safflower proved best for reducing mean holes made by leaf eating caterpillar per leaf per plant. Sweet corn, Sunflower, Mustard, Coriander and Marigold were proved best for reducing per cent infestation of Pod borer. It is therefore concluded that the flowering plants Sweet corn, Sunflower, Mustard, Coriander, Safflower and Marigold were found to be best for eco-friendly management of lablab bean pests and can be used as border crops in lablab bean field for conservation biological control. The results of the present findings are based on single season and needs to be checked for next two seasons to get recommendation.

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