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Field evaluation of new molecule emamectin benzoate 5%+ lufenuron 40%WG (Proclaim fit®) against pod borer *Helicoverpa armigera* & *Marcua vitrata* in pigeonpea

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Abstract
The test molecule emamectin benzoate 5%+ lufenuron 40%WG (Proclaim fit®) at different doses i.e. 50, 60 and 70 g/ha was evaluated against pod borers, *Helicoverpa armigera* and *Marcua vitrata* at College of Agriculture campus Vijayapur, Karnataka. Among the dosages tested, emamectin benzoate 5%+ lufenuron 40%WG at 60 and 70 g/ha recorded the lowest (0.4 and 0.3 larvae/plant and 3.3 and 3.0 larvae/plant) population of *H. armigera* and *M. vitrata*, respectively after 7 days of spraying. Untreated treatment recorded the highest number of pod borer; *H.armigera* incidence upto seven days after treatment in both the *kharif* seasons of 2017 and 2018. Pod damage due to the larvae of *H. armigera* and *M. vitrata* was significantly lower in the treatment emamectin benzoate 5%+ lufenuron 40%WG at 70 g/ha (4.2 and 8.6%) followed by lufenuron 5.4% EC (10.6 and 10.4 %). The test product was found to be safe to the natural enemies. Further, emamectin benzoate 5%+ lufenuron 40%WG at 70 and 140 g/ha did not show any phytotoxic effects on pigeonpea.

Keywords: Pod borer complex, helicoverpa, maruca, phytotoxic, natural enemies

Introduction
Pigeonpea (*Cajanus cajan* (L.) Millsp.) is one of the most important pulse crops in India. The centre of origin of pigeonpea is believed to be Asia. It is a rich source of protein and supplies a major share of protein requirement to the population of the country. It is consumed in the form of split pulse as lentil or *dhal*; inaddition the immature green seeds and pods are eaten as a green vegetable. The outercovering of seeds together with the part of kernel provides a valuable feed for milk cattle. The husk of pods and woody parts of the plant are used as fuel. Being a legume, it possessesvaluable properties as a restorer of nitrogen to the soil (Singh *et al.*, 2005) [7]. Among various constraints for low productivity, infestation and loss caused by insect pests is one of the main contributory factors. Nearly 300 species of insect pests are known to infest pigeonpea at various stages of crop growth in India (Lal *et al*., 1981) [5].
The surveys carried out for three years in two districts, Vijayapur and Kalaburagi of Karnataka, India revealed that a total of 30 insect pests were found feeding on pigeonpea in Karnataka. Out of these, two pests *viz.*, gram pod borer, *H. armigera* (Hubner) and eriophid mite, *Aceria cajani* (Channabasavanna). were recorded as major pests on this crop which cause more than 51% damage to the crop, (Balikai and Yelshetty, 2008) [2].
Amongst the insect pests associated with the fruiting phase of pigeonpea crop especially, the pod borer complex *viz*., gram pod borer (*Helicoverpa armigera* Hubner), pod fly (*Melanagromyza obtusa* Malloch) and plume moth (*Exelastis atomosa* Walshingham) cause losses in grain yield ranging from 30 to 100 percent (Adgkar *et al*., 1993) [1].

Materials and Methods
The experiment on evaluation of a molecule emamectin benzoate 5%+ lufenuron 40% WG (Proclaim Fit®) against pod borer complex in pigeon pea was conducted with seven treatments and three replication in Randomized Block Design (RBD) during 2017-18 and 2018-19 at the College of Agriculture, Vijayapur, Karnataka, India. The treatments were imposed at 45 days after sowing. Two sprays were taken at 25 days interval of the crop. The main objectives of this study were to know the bio-efficacy of this molecule against pod borer complex, crop tolerance and also to assess the effect of this molecule on beneficial insects in pigeonpea

ecosystem. The severity of pod borer's incidence on pigeonpea was recorded by selecting five randomly selected plants in three replications. Each replication representing all the sides and observation on number of larvae before and after each treatment recorded to assess the efficacy of different doses of tested insecticide. The total number of pods, webbings and damaged pods per plant was recorded to know the percentage damage due to pod borers. Yield data of each treatment was also recorded and converted toper hectare basis. All the recorded data were subjected to statistical analysis. For phytotoxicity study, five plants were selected at random from each treatment and the total number of leaves and flowers those showing symptoms like leaf injury on tips and leaf surface; wilting; leaf vein clearing; necrosis; epinasty; hyponasty; were recorded. The extent of phytotoxicity is recorded based on following score. The visual phytotoxic scoring was assessed in each treatment as per the European Weed Research Council (EWRC) ratings.

Score	Phytotoxicity (%)
0	No phytotoxicity
1	0-10
3	11-20
4	21-30
5	31-40
6	41-40
7	61-70
8	71-80
9	81-90
10	91-100

Results and discussion

Bio-efficacy of emamectin benzoate 5%+ lufenuron 40%WG was evaluated against pigeonpea pod borers, *H. armigera* and *M. vitrata* during 2017 and 2018 of *Kharif* season in the College of Agriculture, Vijayapur, Karnataka, India. The result on bio efficacy is presented in tables 1-7. Incidence of the pod borers was uniform and above the Economic Threshold Level (ETL) in the field prior to treatment imposition and found varied after the treatments imposition.

After first spray

In 2017-18, the dosages of emamectin benzoate 5%+ lufenuron 40%WG (EB + L) 50, 60, 70 and 150 g/ha was evaluated against pod borer complex in pigeopnpea. Results revealed that all the dosage of EB 5%+ L 40%WG tested were found superior in reducing the pod borers incidence after imposition of treatments along with lufenuron 5.4% EC and indoxacarb 15.8% EC. Among the dosage tested, EB + Lat60 and 70 g/ha recorded the lowest (0.4 and 0.3 larvae/plant and 3.3and 3.0 larvae/plant) population of *H. armigera* and *M. vitrata* respectively after 7 days of spraying. The other treatments like lufenuron 5.4% EC and indoxacarb 15.8% EC also recorded lower population of *H. armigera* and *M. vitrata* larvae. There was no spray in untreated check, which recorded the highest pod borer, *H.armigera* incidence after 7 days after spraying (3.5 larvae/plant) (Table 1and 2).

During 2018-19 season also, the same trend of pod borer complex population was noticed in the treatment EB 5%+ L 40%WG at 60 and 70 g/ha recorded the lowest (0.4 and 0.2 larvae/plant and 3.0 and 2.8 larvae/plant) population of *H. armigera* and *M. vitrata*, respectively after 7 days spray. The next best treatments were lufenuron 5.4% EC and indoxacarb 15.8% EC they also recorded lower population of *H. armigera* and *M. vitrata* larvae. Untreated check recorded the highest pod borer, *H. armigera* and *M. vitrata* incidence after 1, 3, 5 and 7 days after spray.

After second spray

The data in table 1and 2 also cleared that the tested dosages of EB 5%+ L 40%WG were found significantly superior over the untreated control in reducing the pod borers incidence and which were on par with each other after second spray. Wherein, the treatment EB 5%+ L 40%WG at 60 and 70 g /ha recorded 0.3 and 0.2 larval population of *H. armigera* and 2.2 and 2.0 larval population of *M. vitrata*/plant. The lowest (0.2 larvae/plant and 2.0 larvae/plant) incidence of pod borers, *H. armigera* and *M. vitrata* was noticed in the plot treated with EB 5%+ L 40%WG at 70 g/ha after 7 days of spray. After 3 and 5 days of spray the trend was remained the same in minimising the pod borer population. Treatments like lufenuron 5.4% EC and indoxacarb 15.8% EC were found on par with emamectin benzoate 5% treatment. The highest larvae of *H.armigera* incidence was observed in untreated check (2.6 larvae/ plant)

Similar trend of pod borer population was observed in second spray of next season during 2018-19 also. The least population of *H. armigea* (0.2 and 0.1) and *M. vitrata* (2.0 and1.8) was recorded in EB 5%+ L 40%WG at 60 and 70 g/ha respectively after seven days spray. Untreated check recorded the higher population of pod borer; *H.armigera* incidence after 1, 3, 5 and 7 days after spray (2.0, 2.4, 3.0 and 3.4 larvae/plant respectively). These findings are associated with Patel *et al.* (2015) [6] reported that, lambda-cyhalothrin 4.9 % CS at 25 g.a.i./ha proved effective insecticide against gram pod borer and pod fly in pigeonpea with lower pod damage per cent (26.44%) and higher grain yield (1108.67 kg/ha). Kailash chaukikar *et al.* (2017) [3] reported that emamectin benzoate 5% WG at 6.9 g a.i/ha was found to be the most effective dose against *H. armigera* in chickpea, which was at par with the higher doses of emamectin benzoate 5% WG at 9.4 and 8.1 g a.i./ha.

These results are also associated with result of Krishna japur *et al.* (2016) [4], whose results were revealed that, among all the imposed treatments against pigeonpea pod borer, the emamectin benzoate 5 WG @ 7.50 g.a i/ha was noticed superior in lowering the *H. armigera* larval population of 1.04 per plant with 7.89 % pod damage and with yield of 15.73 q/ha. The untreated control recorded with maximum pod damage of 30.60 %with a minimum yield of 9.13 q/ha.

These results are also in confirmatory with Sudha rani *et al.* (2018) [8], opined that, Among all the treatments imposed against *H. armigera*, the treatments like chlorantraniliprole 20 SC harboured lower larval infestation (0.20 larvae/ plant) and is found on par with flubendamide 20 WG (0.25 larvae/ plant). The next better insecticide found effective in restraining the larval population was novaluron 10 EC (2.95 larvae/ plant) with only 33.20 percent reduction over control. Emamectin benzoate 5SG and indoxacarb 14.5 SC also found superior over control and on par to each other in harbouring larva population of 3.55 and 5.30 larvae/plant with 25.78 and only 10.15 percent reduction over control respectively as against untreated control with maximum larval population (6.58 larvae/plant). The damaged pods were recorded 7.22% in check as compared to only 0.87 to 0.89% damaged pods in treatment of emamectin benzoate 5% WG at 6.9, 8.1 and 9.4 g a.i./ha

Pod damage

Pod damage due to larvae of *H. armigera* and *M. vitrata* was significantly lower in EB 5%+ L 40%WG at 70 g/ha (4.2 and 8.6%) followed by lufenuron 5.4% EC (10.6 and 10.4%). All the doses of test product were found significantly superior over untreated control (21.6 and12.8 %) (Table 5).

Grain yield

All the tested dosage along with standard check were found effective in reducing the pod damage and resulted in significantly higher grain yield compared to the untreated check (11.40 quintal/ha). The plots treated with EB 5%+ L 40%WG at 70 and 60 g/ha were found significantly superior in grain yield (22.40 and 21.60 q/ha) over other tested dosages (Table 5).

Safety of the product on natural enemies/beneficial fauna

The test molecule EB 5%+ L 40%WG at different doses was evaluated against the natural enemies/beneficial fauna like spiders and coccinellids in comparison with standard check and untreated control. After first and second spray, the natural enemies like spider and coccinellid population were equally reduced in all treatments compared to the untreated control. The product was found safe to the natural enemies as the population of natural enemies was similar to that standard check and untreated control (Table 6). These results are in agreement with the finding of Krishna Japur *et al*. (2016) [4], who recorded that, there was no phytotoxic symptoms on any pigeonpea plants treated with various dosages of emamectin benzoate 5 WG. Under field condition, all the dosages of Emamectin benzoate 5 WG proved significantly effective in controlling the pigeonpea pod borer, *H. armigera* infestation and increased pigeonpea pod yield

Phytotoxicity and other harmful effects observed

The phytotoxicity trial EB 5%+ L 40%WG at 70 and 140 g/ha was tested on pigeonpea. Results revealed that, there were no phytotoxic symptoms such as, injury to leaf surface, leaf tip, wilting, vein cleaning, necrosis, epinasty and hyponasty on pigeonpea. It can be concluded based on above data that, EB 5%+ L 40%WG at the above concentration has no phytotoxic effects on pigeonpea cultivar TS 3R.

Conclusion

The test molecule trial EB 5%+ L 40%WG at different doses i.e. 50, 60 and 70 g/ha was evaluated against pod borers, *H. armigera* and *M. vitrata*. Results revealed that, all the above doses were found be effective in reducing the borer's incidence up to 7 days after treatment and thereby increased the grain yield. The test product, EB 5%+ L 40%WG was found safety to the natural enemies. Further, EB 5%+ L 40%WG at 70 and 140 g/ha did not show any phytotoxic effects on pigeonpea cultivar TS 3R.

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Table 1: Effect of EB 5%+ L 40% WG against *H. armigera* in pigeonpea during 2017-18 *Kharif* season

		First spray					Second spray				
Treatments	**Dosage g or ml/ha**	**1 DBS**	**1 DAS**	**3 DAS**	**5 DAS**	**7 DAS**	**1 DBS**	**1 DAS**	**3 DAS**	**5 DAS**	**7 DAS**
Untreated check	-	2.8 (9.63)	3.0 (9.97)	3.2 (10.31)	3.2 (10.31)	3.5 (10.78)	1.8 (7.71)	1.8 (7.71)	2.0 (8.13)	2.4 (8.91)	2.6 (9.28)
EB 5%+ L 40%WG	50	2.9 (9.80)	2.4 (8.91)	2.0 (8.13)	1.8 (7.71)	0.6 (4.44)	1.6 (7.27)	1.4 (6.79)	1.0 (5.74)	0.8 (5.13)	0.4 (3.62)
EB 5%+ L 40%WG	60	2.8 (9.63)	2.3 (8.72)	1.8 (7.71)	1.3 (6.55)	0.4 (3.62)	1.4 (6.79)	1.4 (6.79)	0.8 (5.13)	0.4 (3.62)	0.3 (3.14)
EB 5%+ L 40%WG	70	3.2 (10.31)	3.2 (10.31)	1.3 (6.55)	1.0 (5.74)	0.3 (3.14)	1.4 (6.79)	1.2 (6.29)	0.8 (5.13)	0.2 (2.56)	0.2 (2.56)
Emamectin benzoate 5% WG	150	3.0 (9.97)	2.4 (8.91)	2.0 (8.13)	1.8 (7.71)	0.8 (5.13)	1.8 (7.71)	1.8 (7.71)	1.8 (7.71)	0.8 (5.13)	0.8 (5.13)
Lufenuron 5.4% EC	600	3.2 (10.31)	2.3 (8.72)	2.0 (8.13)	1.7 (7.49)	0.6 (4.44)	1.8 (7.71)	1.8 (7.71)	1.6 (7.27)	1.4 (6.79)	0.8 (5.13)
Indoxacarb 15.8 % EC	333	3.2 (10.31)	2.8 (9.63)	2.4 (8.91)	2.2 (8.53)	1.8 (7.71)	2.0 (8.13)	2.0 (8.13)	1.8 (7.71)	1.8 (7.71)	1.0 (5.74)
	SEm±	NS	0.43	0.36	0.37	0.24	NS	0.13	0.10	0.08	0.07
	CD (5%)	NS	1.30	1.09	1.12	0.73	NS	0.40	0.33	0.24	0.21

Figures in parentheses are square root transformed values DBS- Days before application; DAS- Days after spraying

Table 2: Effect of EB 5%+ L 40% WG against *M. vitrata* in pigeonpea during 2017-18 *Kharif* season

		First spray					Second spray				
Treatments	**Dosage g or ml/ha**	**1 DBS**	**1 DAS**	**3 DAS**	**5 DAS**	**7 DAS**	**1 DBS**	**1 DAS**	**3 DAS**	**5 DAS**	**7 DAS**
Untreated check	-	5.0 (12.92)	5.0 (12.92)	5.2 (13.18)	5.4 (13.44)	5.4 (13.44)	3.2 (10.31)	3.2 (10.31)	2.8 (9.63)	3.0 (9.97)	2.4 (8.91)
EB 5%+ L 40%WG	50	5.7 (13.81)	4.4 (12.11)	4.4 (12.11)	4.2 (11.83)	4.0 (11.54)	3.4 (10.63)	3.2 (10.31)	3.0 (9.97)	3.0 (9.97)	2.4 (8.91)
EB 5%+ L 40%WG	60	4.7 (12.52)	4.2 11.83)	4.2 (11.83)	3.5 (10.78)	3.3 (10.47)	3.2 (10.31)	3.0 (9.97)	2.8 (9.63)	2.8 (9.63)	2.2 (8.53)
EB 5%+ L 40%WG	70	4.2 (11.83)	4.0 (11.54)	3.2 (10.31)	3.2 (10.31)	3.0 (9.97)	3.0 (9.97)	2.8 (9.63)	2.6 (9.28)	2.4 (8.91)	2.0 (8.13)
Emamectin benzoate 5% WG	150	4.3 (11.97)	3.9 (11.39)	3.7 (11.09)	3.7 (11.09)	3.5 (10.78)	3.4 (10.63)	3.2 (10.31)	3.0 (9.97)	2.8 (9.63)	2.4 (8.91)

Lufenuron 5.4% EC	600	4.0 (11.54)	3.9 (11.39)	4.0 (11.54)	3.8 (11.24)	3.4 (10.63)	3.0 (9.97)	3.0 (9.97)	3.0 (9.97)	3.0 (9.97)	2.4 (8.91)
Indoxacarb 15.8 % EC	333	5.0 (12.92)	5.0 (12.92)	4.8 (12.66)	4.5 (12.25)	4.2 (11.83)	3.6 (10.94)	3.3 (10.47)	3.2 (10.31)	3.2 (10.31)	2.6 (9.28)
	SEm±	NS	0.31	0.31	0.30	0.27	NS	0.1	0.20	0.3	0.15
	CD (5%)	NS	1.08	0.92	0.90	0.81	NS	0.3	0.60	0.9	0.45

Figures in parentheses are square root transformed values DBS- Days before application DAS- Days after spraying

Table 3: Effect of EB 5%+ L 40% WG against *H. armigera* in pigeonpea during 2018-19 *Kharif* season

		First spray					Second spray				
Treatments	**Dosage g or ml/ha**	**1 DBS**	**1 DAS**	**3 DAS**	**5 DAS**	**7 DAS**	**1 DBS**	**1 DAS**	**3 DAS**	**5 DAS**	**7 DAS**
Untreated check	-	2.4 (8.91)	3.2 (10.31)	3.4 (10.63)	4.0 (11.54)	4.0 (11.54)	1.8 (7.71)	2.0 (8.13)	2.4 (8.91)	3.0 (9.97)	3.4 (10.63)
EB 5%+ L 40%WG	50	2.8 (9.63)	2.4 (8.91)	1.4 (6.79)	0.8 (5.13)	0.6 (4.44)	1.8 (7.71)	1.4 (6.79)	0.8 (5.13)	0.4 (3.62)	0.4 (3.62)
EB 5%+ L 40%WG	60	2.4 (8.91)	2.2 (8.53)	1.2 (6.29)	0.4 (3.62)	0.4 (3.62)	1.6 (7.27)	1.4 (6.79)	0.8 (5.13)	0.4 (3.62)	0.2 (2.56)
EB 5%+ L 40%WG	70	2.6 (9.28)	2.4 (8.91)	1.0 (5.74)	0.4 (3.62)	0.2 (2.56)	1.6 (7.27)	1.2 (6.29)	0.4 (3.62)	0.2 (2.56)	0.1 (1.81)
Emamectin benzoate 5% WG	150	2.4 (8.91)	2.2 (8.53)	1.2 (6.29)	0.8 (5.13)	0.6 (4.44)	1.8 (7.71)	1.6 (7.27)	1.0 (5.74)	0.6 (4.44)	0.4 (3.62)
Lufenuron 5.4% EC	600	2.6 (9.28)	2.2 (8.53)	1.2 (6.29)	0.8 (5.13)	0.6 (4.44)	2.0 (8.13)	1.6 (7.27)	1.2 (6.29)	1.0 (5.740	0.8 (5.13)
Indoxacarb 15.8 % EC	333	2.8 (9.63)	2.4 (8.91)	1.4 (6.79)	1.2 (6.29)	1.2 (6.29)	1.8 (7.71)	2.0 (8.13)	1.2 (6.29)	1.2 (6.29)	0.8 (5.13)
	SEm±	NS	0.1	0.3	0.4	0.3	NS	0.1	0.3	0.2	0.07
	CD (5%)	NS	0.3	0.9	1.2	0.89	NS	0.3	0.9	0.6	0.2

Figures in parentheses are square root transformed values DBS- Days before application DAS- Days after spraying

Table 4: Effect of EB 5%+ L 40% WG against *M. vitrata* in pigeonpea during 2018-19 *Kharif* season

		First spray					Second spray				
Treatments	**Dosage g or ml/ha**	**1 DBS**	**1 DAS**	**3 DAS**	**5 DAS**	**7 DAS**	**1 DBS**	**1 DAS**	**3 DAS**	**5 DAS**	**7 DAS**
Untreated check	-	4.0 (11.54)	4.2 (11.83)	4.4 (12.11)	4.4 (12.11)	4.4 (12.11)	3.4 (10.63)	3.2 (10.31)	2.9 (9.80)	3.2 (10.31)	2.8 (9.63)
EB 5%+ L 40%WG	50	4.2 (11.83)	4.0 (11.54)	3.4 (10.63)	3.2 (10.31)	3.2 (10.31)	3.4 (10.63)	3.2 (10.31)	2.9 (9.80)	2.8 (9.63)	2.8 (9.63)
EB 5%+ L 40%WG	60	4.6 (12.39)	4.4 (12.11)	3.4 (10.63)	3.2 (10.31)	3.0 (9.97)	3.4 (10.63)	2.8 (9.63)	2.4 (8.91)	2.2 (8.53)	2.0 (8.13)
EB 5%+ L 40%WG	70	4.4 (12.11)	4.0 (11.54)	3.0 (9.97)	3.0 (9.97)	2.8 (9.63)	3.4 (10.63)	2.8 (9.63)	2.4 (8.91)	2.0 (8.13)	1.8 (7.71)
Emamectin benzoate 5% WG	150	4.0 (11.54)	4.0 (11.54)	3.8 (11.24)	3.6 (10.94)	3.4 (10.63)	3.0 (9.97)	3.4 (10.63)	3.2 (10.31)	3.0 (9.97)	2.6 (9.28)
Lufenuron 5.4% EC	600	4.2 (11.83)	4.0 (11.54)	3.8 (11.24)	3.6 (10.94)	3.4 (10.63)	3.4 (10.63)	3.2 (10.31)	3.0 (9.97)	3.0 (9.97)	2.4 (8.91)
Indoxacarb 15.8 % EC	333	4.4 (12.11)	4.4 (12.11)	4.0 (11.54)	3.8 (11.24)	3.6 (10.94)	3.4 (10.63)	3.0 (9.97)	3.0 (9.97)	3.0 (9.97)	2.4 (8.91)
	SEm±	NS	NS	NS	0.4	0.3	NS	0.2	0.21	0.17	0.24
	CD (5%)	NS	NS	NS	1.2	0.9	NS	0.6	0.63	0.5	0.71

Figures in parentheses are square root transformed values DBS- Days before application DAS- Days after spraying

Table 5: Effect of EB 5%+ L 40% WG against per cent pod damage in pigeonpea

		2017-18			2018-19		
		Per cent pod damage			Per cent pod damage		
Treatments	**Dosage g or ml/ha**	***H.armigera***	***M. vitrata***	**Yield (q/ha)**	***H.armigera***	***M. vitrata***	**Yield (q/ha)**
Untreated check	-	21.6 (27.69)	12.8 (20.96)	11.40 (19.73)	20.50 (26.92)	11.8 (20.09)	8.40 (16.85)
EB 5%+ L 40% WG	50	14.9 (22.71)	11.2 (19.55)	19.20 (25.99)	12.50 (20.70)	10.4 (18.81)	16.00 (23.58)
EB 5%+ L 40%WG	60	6.6 (14.89)	8.8 (17.26)	21.60 (27.69)	4.20 (11.83)	8.2 (16.64)	16.80 (24.20)
EB 5%+ L 40%WG	70	4.2 (11.83)	8.6 (17.06)	22.40 (28.25)	3.90 (11.39)	7.8 (16.22)	17.40 (24.65)
Emamectin benzoate 5% WG	150	11.2 (19.46)	10.6 (19.00)	20.40 (26.85)	9.50 (17.95)	10.0 (18.44)	16.40 (23.89)
Lufenuron 5.4% EC	600	10.6 (19.00)	10.4 (18.81)	20.20 (26.71)	9.60 (18.05)	10.4 (18.81)	16.40 (23.89)
Indoxacarb 15.8 % EC	333	12.6 (20.79)	11.5 (19.82)	20.00 (26.56)	11.60 (19.91)	11 (19.37)	16.00 (23.58)
	SEm±	0.9	0.8	0.9	0.60	0.4	0.65
	CD (5%)	2.71	2.4	2.8	1.77	1.2	2.00

*Figures in parentheses are square root transformed values

Table 6: Effect of EB 5%+ L 40% WG on predatory population in pigeonpea

Treatments	Dosage (ml or g /ha)	Coccinellids/plant		Spiders/ plant	
		After first spray	After second spray	After first spray	After second spray
Untreated check	-	0.50	0.20	0.00	0.10
EB 5%+ L 40%WG	50	0.00	0.10	0.20	0.00
EB 5%+ L 40%WG	60	0.20	0.00	0.00	0.00
EB 5%+ L 40%WG	70	0.40	0.10	0.00	0.00
Emamectin benzoate 5% WG	150	0.00	0.00	0.10	0.10
Lufenuron 5.4% EC	600	0.00	0.00	0.00	0.20
Indoxacarb 15.8 % EC	333	0.50	0.10	0.00	0.20

*Figures in parentheses are square root transformed values

Table 7: Evaluation of EB 5%+ L 40% WG for phytotoxicity on pigeonpea plants during 2018-19 *kharif* season

Treatments	Dose (gm/ha)	Score values on																											
		1 DAA						3 DAA						5 DAA						7 DAA						10 DAA					
		A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
EB 5%+ L 40%WG	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EB 5%+ L 40%WG	140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Untreated control	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

A: Leaf injury on tips and leaf surface; B: Wilting; C: Leaf vein clearing; D: Necrosis; E: Epinasty; F: Hyponasty; DAS: Days after Spray

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