Evaluation of pre-harvest spray of insecticides for the control of pulse beetle *Callasobruchus chinensis* L. in Redgram

A Padmasri, T Pradeep and B Anil

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**Abstract**

Field-cum-laboratory experiment was conducted to study the effect of pre-harvest spray of insecticides for control of pulse beetle in Redgram at Seed Research and Technology Centre, Prof. Jayashankar Telangana State Agricultural University, Rajendranagar, during Kharif 2016 and 2017. The design used was split plot design consist of five treatments and three spraying schedules with three replications. Adult emergence of pulse beetle and seed damage differed significantly due to pre-harvest spray of insecticides and different spraying schedules. The lowest number of adult emergence were recorded in treatment profenophos 50 EC followed by emamectin benzoate 5 SG and neemazal 10000 ppm. In case of spraying scheduled lower number of adult emergence and seed damage were recorded in spraying at 50% pod maturity and maturity stage as compared to others. In interaction effect significantly lowest adult emergence as well as seed damage were recorded in pre-harvest spraying of profenophos 50 EC 0.012 (1 ml/ litre of water) at 50% pod maturity and maturity stage to check the infestation of pulse beetle during storage up to two months.

**Keywords:** Pre-harvest spray, insecticides, redgram and pulse beetle

**Introduction**

Red gram is an important pulse crop in India. In India, Red gram is one of the most widely cultivated pulse crop. Improper storage conditions affect the pulses, both in quantity and quality. Many insect pests including red flour beetle, grainary weevil, lesser grain borer, damage red gram in storages, however, pulse beetle *Callasobruchus chinensis* L., belonging to the family chrysomelidae, is the most damaging crop pests by to the stored legume industry due to their generalized legume diets and wide distribution, (Ahmed et al. 2003 and Yanagi et al. 2013) [1, 2]. It is a cosmopolitan pest, attacking grain legumes during both pre and post-harvest stages all over the world, (Dias and Yadav.1988) [3]. Normally infestation starts in the field because adult beetles can easily fly and lay eggs on the redgram pods. In India Gujar and Yadav (1978) [4] recorded 32.2 to 55.7 per cent loss in seed weight and 17.0 to 53.5 per cent loss in protein content. In case of severe infestation cent per cent damage is caused by the pest, (Pruthi and Singh 1950) [5]. It is very difficult to manage the pulse beetle which causes heavy losses during storage. Under such situation, it is necessary to find out such strategy which will be helpful to manage the pest. Accordingly to damaging pattern of this pest (Infestation starts right from the field) pre-harvest sanitation spray is a novel method to arrest these insects in the field itself thereby delimiting the damage during storage. It involves the spraying of insecticides during the formation and development of pod and seed at needy concentrations at suitable intervals.

**Materials and Methods**

In field The field trials were conducted from 2016 to 2018 at at Seed Research and Technology Centre, Prof. Jayashankar Telangana State Agricultural University, Rajendranagar with redgram (variety: Asha) adopting Split Plot Design with two factors *i.e.* first factor was insecticides and second factor was spraying schedules with three replications. A crop was raised after following recommended agronomical practices in a plot size 8 x 10 m2 under irrigated condition. Insecticidal spray was applied as per the three spraying schedules *i.e.* spraying at 50% pod maturity (S1), spraying at maturity (S2) and spraying at 50% pod
maturity and maturity (S3). The crop was imposed with pre-
harvest spray using emamectin benzoate 5 SG @ 0.3g per litre, 
Malathion 50 EC @ 1 ml/litre (I2), profenofos 50 EC 1 
ml/litre (I3) and Neemazal 10000 ppm 14.5 SC with knapsack 
sprayer as prophylactic measures against pulse beetle. The 
unsprayed plots served as control (I5).

In storage
After threshing, 1000 g seed was collected from each 
treatment, replication-wise. Such quantity of seed was kept in 
cloth bag ensuring protection from cross infestation during the 
storage period. The observations on adult emergence were 
recorded at weekly interval up to two month. Number of seeds 
having exit hole (damaged seed) were counted at the end of 
the two months. For the purpose, 100 seeds were 
randomly selected from each treatment replication-wise and 
seeds having exit hole were counted. The data recorded on 
adult emergence and seed damage based on exit hole was 
subjected to ANOVA.

Results and Discussion
Three years pooled data on adult emergence in pre-harvest 
spaying of different insecticides, spraying schedules and 
interaction effect of pre-harvest spraying and spraying 
scheduled was showed no adult emergence up to two week of 
storage. Lowest number of adult emergence (16.87) was 
recorded in treatment profenophos 50EC (I3) followed by 
emamectin benzoate 5 SG (I1) and neemazal 10000 ppm (T4). 
In case of spraying scheduled lower number of adult 
emergence (25.30) was recorded in spraying at 50% maturity 
and maturity (S3) as compared to others. The results of 
interaction effect were found significant and lowest adult 
emergence was recorded in treatment combination 
profenophos 50 EC spraying at 50% maturity stage and 
maturity (I3S3) in redgram. 

Minimum seed damage (0.01%) was recorded in pre-
harvest spraying of profenophos 50EC followed by malathion 
50EC. The significant effect of spraying schedule and 
combination with pre-harvest spraying on seed damage was 
found in redgram. The results of interaction effect were found

Table 1: Evaluation of pre-harvest spraying of insecticides for the management of pulse beetle (Callosobruchus sp) pooled analysis

| Adult emergence/kg seed | T1 (Emamectin benzoate) @ 0.3 ml/litre | T2 (Malathion 50 EC @ 1ml/litre) | T3 (Profenofos 50 EC @ 1ml/litre) | T4 (Neemazal 10000 ppm @ 1ml/litre) | Control | Mean |
|-------------------------|---------------------------------------|---------------------------------|-----------------------------------|-----------------------------------|--------|------|
| S1 (Spraying at 50% pod maturity) | 28.07 | 29.07 | 15.55 | 19.03 | 70.89 | 32.59 |
| S2 (Spraying at Maturity) | 37.91 | 51.26 | 25.05 | 42.30 | 75.44 | 46.55 |
| S3 (Spraying at 50% pod maturity and maturity) | 9.47 | 17.26 | 9.22 | 17.49 | 73.07 | 25.30 |
| Mean | 25.14 | 32.65 | 16.87 | 26.27 | 73.14 |
| T | S | T at S | S at T |
| S.Ed | 0.615 | 0.42 | 0.99 | 0.95 |
| CD (0.05) | 1.42 | 0.88 | 2.14 | 2.05 |

Table 2: Evaluation of pre-harvest spraying of insecticides for the management of pulse beetle (Callosobruchus sp) pooled analysis

| Seed damage (%) | T1 (Emamectin benzoate) | T2 Malathion | T3 Profenofos | T4 Neemazal 10000 ppm | T5 Control | Mean |
|-----------------|------------------------|--------------|---------------|-----------------------|-----------|------|
| S1 (Spraying at 50% pod maturity) | 0.45 | 0.39 | 0.16 | 0.46 | 1.81 | 0.654 |
| S2 (Spraying at Maturity) | 0.54 | 0.42 | 0.20 | 0.56 | 1.73 | 0.69 |
| S3 (Spraying at 50% pod maturity and maturity) | 0.12 | 0.20 | 0.01 | 0.23 | 1.76 | 0.464 |
| Mean | 0.37 | 0.34 | 0.12 | 0.42 | 1.77 |
| T | S | T at S | Sat T |
| S.Ed | 0.009 | 0.005 | 0.012 | 0.013 |
| CD (0.05) | 0.02 | 0.01 | 0.02 | 0.03 |
| CV (%) | 2.63 | ~ 431 ~
Conclusion
Among the different treatments, spraying of profenophos 50 EC at 50% maturity and maturity stage were found more effective in checking cross infestation of pulse beetle in redgram and also recorded with lowest adult emergence and lowest seed damage.

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