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Evaluation of the Exact Spraying Time of Chemicals for Management of *Bruchus Pisorum* Under Field Condition's

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Abstract

Ethiopia have highly potential to produce field pea, this crops produce in Ethiopia from ancient time still now and the societies use it for different purpose such as to prepare cultural food, in household consumption and as a source of income. It is substantial crop and substitute meat nutritional value, as a source of protein. Field pea production has different constraints such as weed, disease and insect pest problems, and bruchuspisorum is major insect pest which is decline quantity of production in Ethiopia. The experiment was done at Holleta Agriculture Research center in the field condition with four replication in Completed Randomized Block Design. The objective of this study was to distinguish the exact chemical spraying time in the field to control bruchuspisorum. The variety was Adi, Wolemera, Markos and Burkitue, the chemical treatment were spraying during, early flowering, flat and full podded as recommended level, three times in every week. As a result there was significance difference between pre flowering chemical spraying time, flat podded spraying and full podded spraying time, on the number of larvae per pod ($F_{13,18}$ at 0.005=11.13, $p<0.0001$). There was least recorded of number of larvae on per pod in full and flat pod spraying time. Even if there was no significance difference among the flat and full podded spraying time, in full podded spraying time, there was no larvae recorded totally. So in order to manage field pea bruchuspisorum in the field condition, the chemical spraying must be started from flat podded and will continued until to full podded.

Keywords: Bruchs Pisorum; Chemicals; Time of application; Field pea; Flat and full pod

1. Introduction

Pea is cold season crop which is important source of protein, fat and carbohydrate like other pulses [1]. Field pea (*Pisumsativum* L.), a native of Southwest Asia, it was among the first crops cultivated by man. Wild field pea produced in Afghanistan, Iran and Ethiopia. Today, the country's leading in field pea production include Rashia, China, India, Canada, and the United States. Cultivation of field pea, it could be grown for vegetable, for seed and fodder and for edible podded types. Green and yellow seeded varieties are used for human consumption. It has high level of protein content (amino acid) such as lysine and tryptophan which are usually low in cereal crops. As a result field pea can supplement the cereal grains which have low content of protein in food and feed [2]. It is also used as protein source for livestock and is popular pigeon feeds. The use of vegetable proteins as functional ingredients in the food industry is increasing. Protein content of forage can increase by addition seed peas.

In Ethiopia, pea is widely grown in mid to high altitude and total area coverage reaching 212,890 ha with an annual production of 2,632,663.87t [3]. It is the major food legumes and substitute meats nutritional value (cheap source of protein having essential amino acids (23-25%)) for the person who have low income resource and also it is income source [4]. The crop has important ecological and economic advantages in the highlands of Ethiopia; it has significant role on soil fertility restoration, though farmers used it for rotation purpose. Field pea bruchid is major production constraint of field pea in Ethiopia, which was introduced before ten years through quarantine. *Bruchus pisorum* is a colleoptera insect pest, well distributed all over the world, mainly in tropical regions of Asia, Africa, central and south America. Females lay eggs outside the pod [5]. The infestation started on the pods and entered in to seed and continues its life cycle in the. The hatched larvae burrow directly from the eggs through to the pod wall and into the seed, creating a small, dark entry hole, about 0.2 mm in diameter. After pupation with in growing the seed, the adult chews on exit hole through the seed coat. Eggs are never laid on dried peas, and there is no re-infestation in storage, both adult, and larvae, feed inside of seeds, damage is distinctive, feeding causes tiny dot-like entrance holes. Generally bruchids fecundity depends on temperature, humidity and food, when temperature above 30c^{o} and relative humidity becomes 82 percent fecundity of bruchids becomes maximum [6]. Damage of field pea seeds due to this insect, cause of yield loss and minimize seed quality at grain and dry condition. The damaged seeds with bruchid emergence hole had significantly low, vigor and sowing characteristics. There is no clearly evidence on germination but the embryonic tissue affected by this insect pest. The adult is grey to brownish gray with small white spots on the elytra .The larva develop inside the seed and, it look like white worms, which have reduce legs and cause of grain seed damage or loss of weight and quality of grains. Main source of pea weevil are, broken peas in the field and stored infested seeds. It can devastate the seed in storage, quickly loss weight and quality of the grain. These insect pests as you know it is quarantine insect pest; it is well known its distribution in Ethiopia but still well

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not its real infestation time on crop stage (flowering, pod, mature or pre maturity time) ,and still have no preventive option to control it.

1.1. Objective of the Study

To investigate the exact chemical spray time to control *bruchus pisorum* infestation in the field.

2. Materials and Methods

The genetic material was collected from pulse breading department at Holetta Agriculture Research Center (HARC), those genetic materials are Adi, Burkitu, Markos, and Wormela. The experimental design was Completed randomized block design (CRBD) with four replication. Each plot size was 3*4m, the space between plants 20 cm and between block 2m gab. Sawing date was on main production season.The chemical treatment were spraying during three stage of the crop, these were, pre flowering, flat podded and full podded crop stage.After maturity, through randomization take ten pods per plot and count number of larvae per seed, per pods in the laboratory. The data were analysis by using sas software program and mean separation was by using Tukey studentized Range test ($P<0.05$).

3. Results and Discussions

Time of treatment application for management of *bruchus pisorum* in the field condition.

There was highly significance difference between time of application ($F_{13, 18}$ at 0.05=11.13, $P<0.0001$).

Table-1. Effect of time application of chemicals for management of *bruchus pisorum* in the field conditions, least recorded of larvae per pod and yields (Mean ± STD Dev)*

Time of application	Number of larvae recorded per pod	Yield per kg
Per flowering	0.50±0.07A	0.35783±0.1A
Flat podded	0.10±0.05C	0.29446±0.07A
Full podded	0.00±0C	0.44578±A
Cheke	0.30±0.05B	0.37769±0.07A
F-value	11.13	2.73
P-value	<0.0001	>0.035
%CV	58.84	29.26

*Means ± **STD Dev** followed by the same letter (s) within a column are not significantly different from each other at P< 0.05 using a Tukey Studntized range test (HSD).

The result shown in the (Table 1) there is significance difference the time of application, this result tell us it is good opportunity to control *bruchus pisorum* by spraying chemical during flat and full podded crop stage.

On the other hand in yield there is no significance difference, this is why it is happen, because the biological behavior of this insect is, its infestation started in the field and its damage level continue in the storage, so at the time of this data were taken, the larvae stage has no the capacity to destroyed the seed parts, this much, but when it will continue its life stage in the storage , it has the capacity to destroy the seed weight, the active part of the seed and the quality of the seed, when the adult emerge and come out from the seed at the finality.

Table-2. The effect of the interaction between variety, replication, and time of application (Variety*Time) on number of larvae per pod

Source of variation	DF	Mean Square	F-value	Pr>F
Variety	3	0.278	15.87	0.0001
Rep	3	0.012	0.74	0.5487
Time	3	0.593	33.87	<0.0001
Variety *Time	9	0.192	10.99	<0.0001

There was significance difference among the variety and interaction of both variety and time of application ($F_{13, 18}$ at 0.05=15.87, $p<0.003$, $F_{13, 18}$, at 0.05=10.99 $p<0.0001$) respectively. According to variety interaction, Wolmera has less infestation or least recorded of larvae per pod compare to the rest one.

4. Conclusion and Recommendations

In this finding in order to control the *brucus pisorum*, the exact chemical spraying time is, started from flat podded it must be continued until full poded. It also needs frequently spray. It needs further more study the interaction and population dynamics of this insect with the environment, genotypes and response of it's with different insecticide application. And also need to study the pesticide application contribution for storage life shelfe and seed viability after post harvests.

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