I J R B A T, Issue (IX), Vol. I, Jan 2021: 41-46 e-ISSN 2347 – 517X
A Double-Blind Peer Reviewed & Refereed Journal Original Article
INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY
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EFFECT OF PUMPKIN (*CUCURBITA PEPO*) PLANT EXTRACT AGAINST THE STORED GRAIN INSECT PESTS

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Communicated: 13.12.20 Revision :15.12.20 & 20.12.2020 Accepted: 16.01.2021 Published: 30.01.2021

ABSTRACT:
The present study carried out to investigate insecticidal efficiency of commonly used plant leaf extract that is pumpkin (*Cucurbita pepo*) against commonly found stored grain pests *Sitophilus oryzae* and *Tribolium castaneum*. The extract shows the insecticidal activity against the both pests. The results reveal that the plants extracts have effect on first day of treatment and as number of days increased the % mortality also highly increased. The result also revealed that this extract strongly repels *T. castaneum* and *S. oryzae* even at low concentration, but its repellency was more marked towards *T. castaneum*.

Key words: - *Cucurbita pepo, Insecticidal activity, Sitophilus oryzae, Tribolium castaneum*

INTRODUCTION:

Introduction

Insects are one of the most diverse group having economically destructive and beneficial role to human society. The insect or animal that damage the crop are simply called as pest. Stored grain pests are one of the severe problem reported by eailer researchers. The commonly reported Sitophilus oryzae, Sitophilus granarius (Rice weevil), Callosobruchus chinensis (Pulse beetle), Tribolium castaneum, Tribolium confusum (Red flour beetle) and Corcyra cephalonica (Rice moth) are the potent insect pests.

Maximum destruction to stocked foodstuffs is created by insects belonging to the order Coleoptera. These insects are responsible for 10% loss of world cereal production and ultimately decreases the economy (Wolpert, 1967). In India, production of grain has gained 250 million tons in the year 2010-11, out of which about 20-25% of food grains get damaged by storing grain insect pests (Rajashekar et al., 2012). In which, most common pests found are Rice weevil (Sitophilus oryzae) and Red flour beetle (Tribolium castaneum). So there is necessity to control the pests of stored grains (Kaliramesh S. et al., 2013).

Basically two methods were adopted to control these pests as chemical control and biological control. In chemical control method wide range of chemicals are utilized like DDT (which is now banned), methyl bromide, phosphine, cyanogens and ethyl formate (Davis and Frederick Rowe, 2014). Due to their various properties like availability, effectiveness, stability and most important low cost is widely accepted by society. However, it has detrivorous imacts those directly related to the human being as well as to the environment (Kathirvelu and Senthoor Raja, 2015). The extensive use of chemicals results in some hazards problems i.e. resistant development of insect strains to insecticides (Zettler and

Cuperus, 1990), accumulation of toxic residues on stored grains and ultimately toxicity to consumers. As a result, symptoms of this exposure may begin and shows health issues like headache, nausea, vomiting and stomach cramps as reported earlier (Jeyaratnam, 1990).

In the biological control method, use of living organisms like microorganisms or animals or extracted constituents of plants is used and it is more safer with their use as compare to the chemical method. The common practice is undertaken to control different stored grain pests by applying extracts of various parts of plants and obtained positive promising results. Research reveals that, extracts prepared from plants had a variety of properties including activity of insecticidal, repellency, antifeedent and insect growth regulation etc. (Prakash and Rao, 1997) and plants are easily available, inexpensive and biodegradable (Prakash and Rao, 1997; Mishra et al.,2012). Hence, biocontrol method is the best replacement for chemical control method.

Considering the beneficial properties and need for nontoxic, ecofriendly and inexpensive insecticide to manage the stored grains insects, the present study was carried out to investigate efficiency of plant leaf extract that is Pumpkin (Cucurbita pepo) against commonly found stored grain pests that is Sitophilus oryzae and Tribolium castaneum.

MATERIAL & METHODS:

Insects

Sitophilus oryzae and *Tribolium castaneum* were collected from stores and godowns and stored in plastic bottles with the grains in which they were found and brought to the laboratory and further used for experiment. During study they were sort out in plastic jars and covered with muslin cloth, so that they remain alive.

Plant material

To test the efficiency of *Cucurbita pepo* plant, it was selected for the experiment. The leaves of *Cucurbita* were collected from agricultural farm from Kavathe village. Leaves were first washed and were kept for air drying under shade.

Preparation of extract

Soxhlet apparatus was used for the extraction, about 40 gram powder of *Cucurbita pepo* leaves were extracted with 400 ml of ethyl alcohol. The extraction of plant sample was done in 24 hrs. of duration. The gel like extract was formed and for evopration of remaing ethyl alcohol they were kept for 24hrs. on water bath. The extract were stored at 4^0C prior to application.

Bioassay test/ Treatment

Acetone was used in the preparation of different concentration doses (mg/ml) and for each prepared concentration three replicates were studied for both the target species. Control did not contain extract. Each jar with 10gm of grains of wheat were added with 0.3ml of dose of different extract concentrations and released 10 adults of both the target species in seprate jars. Both the sets were kept under observation to check mortality. After 24 hours, the sets were observed and mortality was recorded. Reading for each set was recorded for 14 days.

RESULT & DISCUSSION:

The results of the insecticidal action of Pumpkin (Cucurbita pepo) plant extract were evaluated against stored grain pests Sitophilus oryzae and Tribolium castaneum. The maximum mean mortality (77) of beetle Tribolium castaneum was observed in 25 mg/ml concentration of 14 days dose (Figure. 2). Whereas the lowest mean mortality (23) of beetle Tribolium castaneum was observed in 5

mg/ml concentration of 7 days dose (Figure. 1).

In case of stored grain pests Sitophilus oryzae the present mortality was low as compared to the Tribolium castaneum. The maximum mean mortality (70) of weevil Sitophilus oryzae was observed in 25 mg/ml concentration of 14 days dose (Figure. 4). Whereas the lowest mean mortality (16) of beetle Sitophilus oryzae was observed in 5 mg/ml concentration of 7 days dose (Figure. 3).

Data with respect to percent mortality of Sitophilus oryzae and Tribolium castaneum observed on different days (D) in plastic jars are shown in Table 1 and 2. Table also reveals that the plants extracts have effect on first day of treatment and as number of days increased the % mortality also highly increased. The result also revealed that this extract strongly repels T. castaneum and S. oryzae even at low concentration, but its repellency was more marked towards T. castaneum.

Researchers in different regions of the world have been reported wide range of plants for controlling pests including stored grain pests. Most of the previous studies revealed that different plant compounds were used in controlling pest and they proved effective and eco-friendly (Manzoor et al., 2011). Many researchers investigated the compounds in plants that have a variety of properties including insecticidal activity, repellence to pests, antifeedant effects, insect growth regulation, toxicity to nematodes, mites and other agricultural pests, also antifungal, antiviral and antibacterial properties against pathogens (Norma et al., 2013) . The present work revealed the effect of *Cucurbita pepo* plant leaf extracts on *T. castaneum*. Significant insecticidal activity against *T. castaneum* and *S. oryzae* adults were observed with ethanol extract from *Cucurbita pepo*.

It is evident from our findings that the efficacy of *Cucurbita pepo* leaves against the *T. castaneum* and *S. oryzae* is more or less same. That might be due to presence of same concentration of active principles in either components or different but equally potent bioactive compounds. The obtained results of our findings are in corroboration with those of Owusu (2001). He worked on alcohol extracts of six Ghanaian plant materials to check their efficacy against *T. castaneum* and *S. oryzae*. He reported that leaves of *Ocimum viride* showed significant antifeedant and repellent effects against both but *T. castaneum* was found to be comparatively resistant. But in the present study *T. castaneum* is more susceptible as compare to *S. oryzae* and this might be the result of presence of different potent bioactive compounds of *Cucurbita pepo* leaves.

In relation to the *Cucurbita pepo* plant seed extracts most of the work is concerned and reported its medical importance (Winkler et al., 2005). However there was no single report available in pertaining to its efficacy against *T. castaneum* and *S. oryzae*. Therefore, present study introduces an innovative approach to the use of pumpkin plant for stored wheat protection. Use of powdered forms of tested plant is recommended for small scale farmers due to its simplicity of application, easy removal and non-toxic effects even if consumed by humans as plant having medicinal properties.

CONCLUSION

The plant extract obtained from *Cucurbita pepo* was found as promising plant species showed insecticidal action to protect the insect pest population in the grains during storage.

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Table no. 1 – Insecticidal activity of ethanol leaf extract of *Cucurbita pepo* against *Tribolium castaneum*

Sr. No.	Conc. Of extract mg/ml	Per cent mortality (7-14) days	
		7 days	14 days
1	5	23	47
2	10	30	53
3	15	37	63
4	20	40	67
5	25	43	77

Table no. 2 – Insecticidal activity of ethanol leaf extract of *Cucurbita pepo* against *Sitophilus oryzae*

Sr. No.	Conc. Of extract mg/ml	Per cent mortality (7-14) days	
		7 days	14 days
1	5	16	40
2	10	20	47
3	15	30	57
4	20	36	60
5	25	36	70

Figure 1. Effect of the extracts of *Cucurbita pepo* against *Tribolium castaneum* after 7 days.

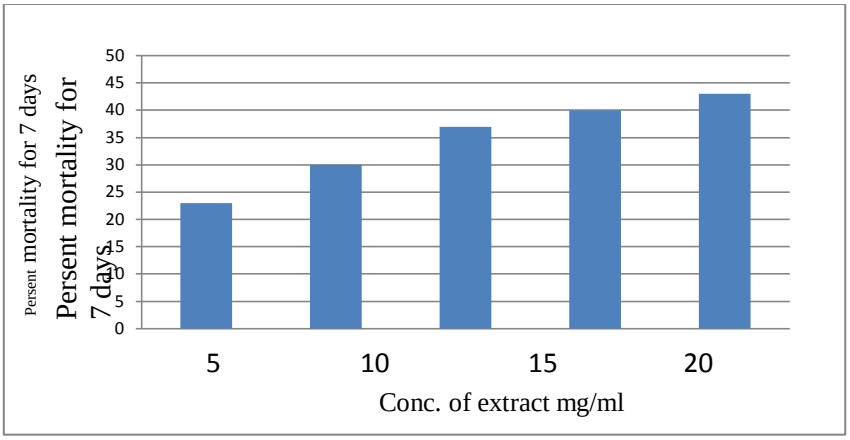

Figure 2. Effect of the extracts of *Cucurbita pepo* against *Tribolium castaneum* after 14 days.

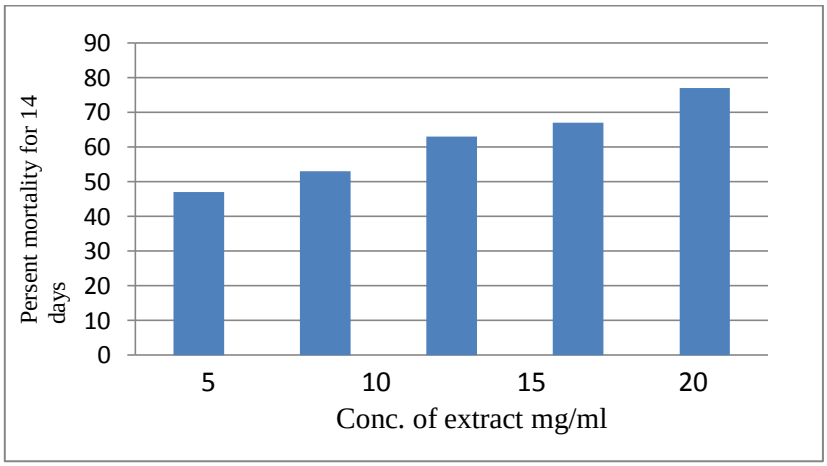

Figure 3. Effect of the extracts of *Cucurbita pepo* against *Sitophilus oryzae* after 7 days.

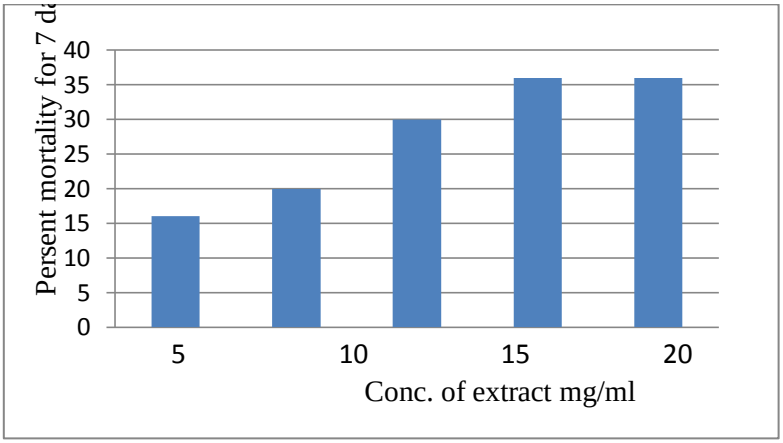

Figure 4. Effect of the extracts of *Cucurbita pepo* against *Sitophilus oryzae* after 14 days.