Comparative Study of Entomotoxicity of Three Medicinal Plant Extracts against Sitophilus oryzae

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Abstract : The Sitophilus oryzae is most wide spread and destructive primary stored cereals and grain pest in world. The major effect of Sitophilus oryzae on an infestation by the feeding activity grubs and adult and increasing the secondary growth of pest by making condition optimum for optimum and further infestation. Plant extracts Azadirachta indica, Osmium Sanctum and Mentha piperita were evaluated for the Entomotoxicity such as repellency, adulticidal and larvicidal effect against Sitophilus oryzae. The Entomotoxicity of plants extracts expressed in percentage and Repellency were also expressed in class repellency with class 1, class 2, Class 3, Class 4 and class 5.TheRepellency with 80% of Class 4, Adulticidaland larvicidal percentage with 100 % of Azadirachta indicaand Adulticidal highest Entomotoxicity effect than Osmium sanctum and Mentha piperita

IndexTerms **- Sitophilus oryzae, Entomotoxicity, Repellency, Adulticidal, Larvicidal**

I. INTRODUCTION

The rice weevil, Sitophilus oryzae L. (Coleoptera: Curculionidae), is the insect pest of stored cereals throughout the world.Female rice weevil oviposit directly into the seeds and completes larval development inside the seeds and emerges as adults(Benhalima,2004).The life cycle of Sitophilus oryzae include four stages such as egg, larva, pupa and adult. The first three stages are completed inside the infested grains. Adults may survive for up to two years depending on the conditions (Ryoo and Cho 1988, Pittendrigh 1997).Among all the biotic factors, insect pests are considered most important and cause huge losses in the grains (30%–40%)(Abass A.B 2004). Some studies on postharvest losses in India estimated about 5% to 10% loss in market value due to infestation by only Sitophuilus spp.

The medicinal plant Azadirachta indicathese non-wood products are known to have antiallergenic, antidermatic, antifungal, anti-inflammatory, insecticidal, larvicidal, nematicidal and other biological activities (AbdallaAbdelrahim 2010).The insecticide from neem is non- phytotoxic with good shelf like and effective against a wide range of insects and pests.Mentha piperita and Ocimum sanctumhave been a potential source of medicine through in a crude form have been used from time immemorial to heal various ailments. A variety of bioactive compounds that are present in different parts of a plant has spurred a renewed interest in developing at alternate therapy (Kathiresan.S, Marimuthu 2011).In the present study the investigation ofcomparative use of three medicinal plant extracts such asAzadirachta indica, Osmium Sanctum and Mentha piperita to control Sitophilus oryzae for the control future postharvest loss of cereals and grains.

II. MATERIALS AND METHODS

COLLECTION OF SITOPHILUS ORYZAE

Collection of S. oryzae was done on at market yard Indapur road Baramati from local stored grain seller

III. COLLECTION PLANT MATERIAL

Leaves of neem (Azadirachta indica), Tulsi (Ocimum sanctum) and Pudina (Mentha piperita) were collected from the T.C.College campus Baramati and left to dry at hot air oven at 50º C.

IV. REARING OF SITOPHILUS ORYZAE

The insect rearing was done by weighted in 100 gram in wheat and kept into the serpent into plastic jar and 50 male and 50 female into introduce each plastic jar and culture is maintained. The jar was maintained at 28±2°C and relative humidity at 70±5%. After 10-15 days, the adults were removed and the jar was left for 45 days to obtain adult beetles and subsequently these beetles were used for the experiments (Yankanchi and Gadache 2010).

Adults of S. oryzae were placed in the rearing medium for 10-15 days; then they were removed and placed in a new medium to obtain a new progeny and avoid generation overlapping. This process was successively repeated with the aim of obtaining homogenous generations.

Preparation of plant extract

Leaves of Neem (Azadirachta indica),Tulsi (Ocimum sanctum) and Pudina (Mentha piperita) were collected and left to dry at hot air oven at 50ºC.They were then grinded to a fine powder with the help of and were kept in dry containers. The 10 gram powder of three plants was weighted and powder dissolved in to the 100 ml distilled water. This mixture of plant leaves powder and distilled water were heat at 80 0C for 3 hours. After that the mixture was cooled and filtered through Watman paper No.1.Plant extracts of Neem, Tulsi and Pudina then stored is air tide bottle and kept on refrigerator for further use(Abdullah 2013).

Entomotoxicity of plant extracts against S.oryzae

Repellency Test of Plant Extracts

Take the three petridish wash out and dry then three petridish divide equally by glass marker. In each petridish add the small ring (Strip) of filter papers. Then add to the 0.5 ml of both dividing part plant extract and distilled water. Then add to the 10 Sitophillus oryzae and observed the repellent behaviourSitophilus oryzae(Talukder 1993).

Statistical analysis

Data were converted to express percentage repulsion (PR) using the following formula: PR (%) = (Nc – 50) X 2, where Nc is the percentage of weevils present in the control half. Mean values were classified according to the following Scale, the class of repellency with the upper and lower limits of repellency rate percentage this are class 0, >0.01 to 0. 1, class 1, 0. 1 to 20, Class2, 20 to 40, Class3, 40 to 60, class4, 60 to 80 and class5, 80 to 100 (Adriana.I.et al…,2008).

Larvicidal Activity

The larvicidal activities of the plant crude extracts were tested as per the modified method of World Health Organization (2005). Separate the 13 plastic jars for weight of 10gm of wheat. Three plant extracts (Neem, Tulsi, Pudina) are different concentration of plant extract is (0.5, 1.0, 1.5, 2.0 mg/ml). The weight of 10gm wheat grains is added to the plant extract. This wheat grains are dried in to the sunlight. After drying introduced the 5 last instar larvae of S. oryzae the plant extract wheat is separately. The numbers of dead larvae were counted after 24 hours of exposure and percentage mortality was recorded from the average of three replicates..

Adulticidal Activity

The adulticidal activity of the plant extracts were as per the modified method of world health organization (2005). Separate 13 plastic jar. Then weight of 10gm of wheat. Three plant extract is the (Neem, Tulsi and Pudina) is the different concentration are plant extract is (0.5, 1.0, 1.5, 2.0 mg/ml) and control is the without extract. The wheat in the dry in sunlight introduces the 10 adult Sitophilus oryzae. Where counted the number of dead adult after 24 hours of expose and percentage mortality was recorded from the average of three replicates.

Observation

Table No. 1 Repellency (%) of extracts of three plants on adults of Sitophilus oryzae

Plant Extracts	Repellency percent at different hours.			Mean repellency Percentage (%)	Class of repellency
	1hrs.	2hrs.	3hrs.		
A.indica	70	80	90	80	4
O.sanctum	40	50	60	50	3
M.piperita	20	30	40	30	2

Table No. 2 Adulticidal effect of A.indica ,O.sanctum and M.piperita

Concentration of plant extract in ml	Days of Mortality in Percent							
	1	2	3	4	5	6	7	8
A.Indica								
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
O.sanctum								
0.5	00	10	10	10	20	20	20	20
1.0	10	10	20	20	30	30	40	40
1.5	10	20	30	30	40	40	50	50
2.0	20	30	40	50	60	60	70	70
M.piperita								
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
2.0	10	20	30	30	40	40	50	60

Table No. 3 .Larvicidal Effect of plant extracts

Concentration of plant extracts	Mortality of *Sitophillus* after 24 hrs. in %
A.indica	
0.5	30
1.0	50
1.5	70
2.0	100
O. sanctum	
0.5	20
1.0	40
1.5	60
2.0	80
M. piperita	

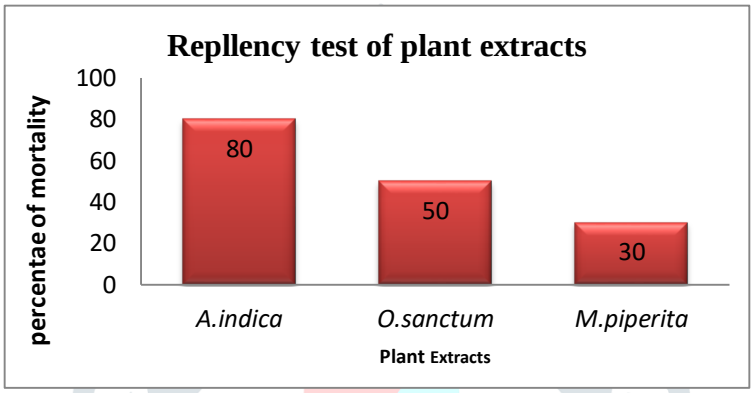
0.5	10
1.0	20
1.5	30
2.0	40

V. RESULTS AND DISCUSSION

In the present study the Entomotoxicity ofS.oryzae were observed against the three medicinal plants extracts with time period of 1, 2 and 3hrs. The adult of S.oryzae were repellent toward the half of circle was treated with the Distilled water.

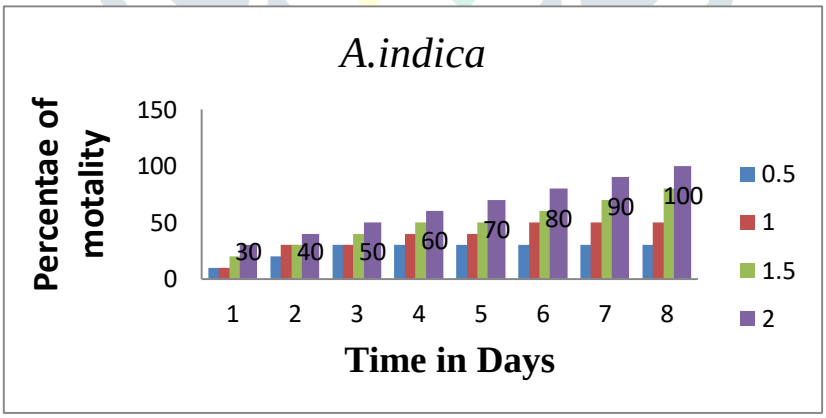
Repellency test of plant extracts against S.oryzae

Among three plant extract tested, the A.indica extract was one with the maximum repellent effect against S.oryzae (class 4) with PR of 80%M.piperita (class 3) with PR 50% and, O.sanctum (class 2) with 30%. The percentage of repellency observed during the 3 hours of the test did not show a defined behaviour either between each hour. The plant extract of A. indica shows maximum activity as compared to plant extract of O. sanctum and M. piperita.

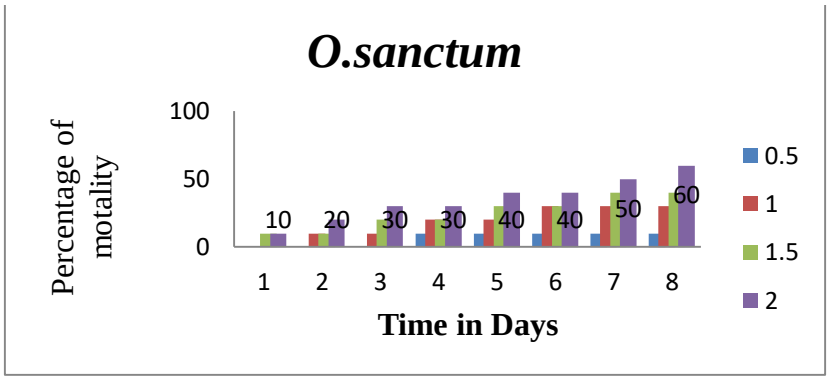


Adulticidal Effect of plant extracts against S. oryzae

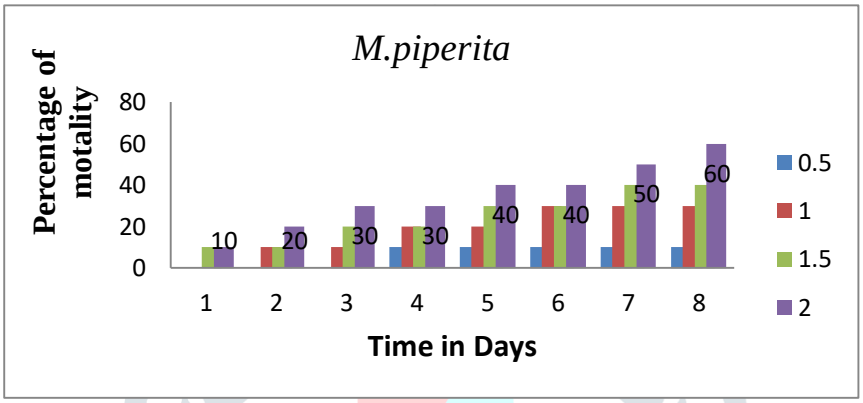
Adulticidal effects of plant extract of Azadirachta indica were used for control of S. oryzae. The low mortality rate is first day is 0.5ml concentration is 30%, and different for different concentration. Moderate amount of mortality rate is 50 % mortality is third day in 2.0ml concentration and 100% of mortality rate is eight days continuously increase the mortality rate..



Adulticidal effects of plant extract of Ocimum sanctum were used to control Sitophilus oryzae in different concentration. The low mortality rate is first day is 0.5 concentration is 10 % in different concentration. Moderate amount of mortality rate is 50 % mortality is seventh day in 1.0 concentration and 60% of mortality rate is eight day.



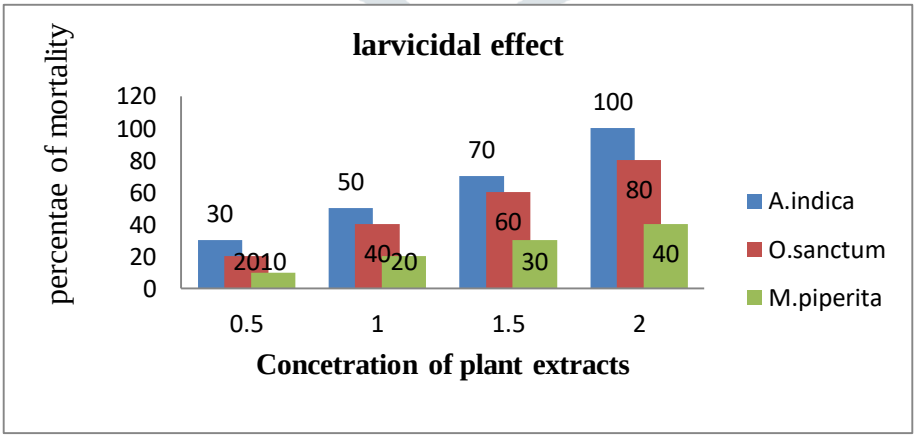
Adulticidal activity of plant extract of Mentha piperita popularly used for this purpose in different concentration. The observed the mortality rate is the first day to the eight day. The low mortality rate is first day is 0.5 concentration is 10 % in different concentration. Moderate amount of mortality rate is 50 % mortality is seventh day in 2.0 concentrations and 60% of\mortality rate is eight day.

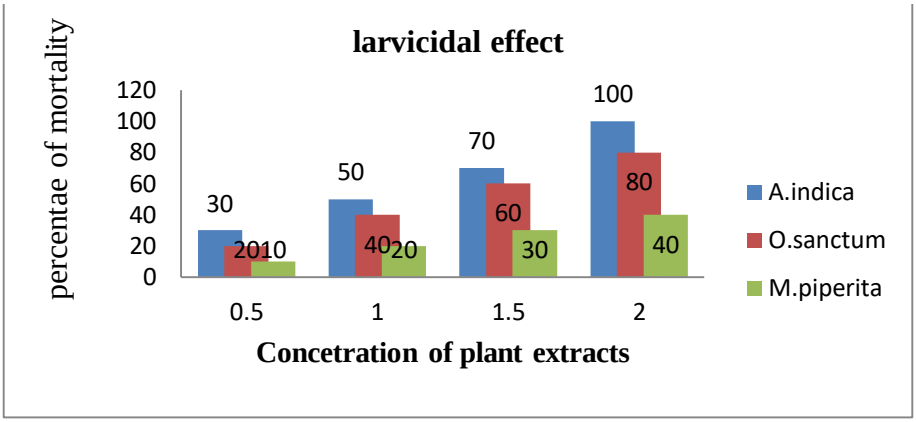


Larvicidal Effect of plant extracts

Larvicidal activity of plant extract popularly used for this purpose in different concentration *Azadirachta indica* low mortality rate in 0.5 concentration in 10% in . Moderate mortality rate in 50% in at conc. 1 but high mortality rate was 100% with*Azadirachta indica* continuously increase of the mortality rate.Larvicidal activity of plant extract popularly used for this purpose in different concentration is *Ocimum sanctum* low mortality rate is 0.5 concentrations in is 20% moderate mortality rate 60% of at concentration. Is 1.5, but high mortality rate is 80% in continuously increase of the mortality rate.Larvicidal activity of plant extract popularly used for this purpose in different concentration is *Mentha piperita* low mortality rate is 0.5 concentration is 10% in and moderate mortality rate is 30% wereconcentration. 1.5, but 40% mortality is continuously increase of the mortality rate.

The graphs were showingthe maximum mortality rate is *Azadirachta indica*, moderate mortality rate is *Ocimum sanctum* and less mortality rate is *Mentha piperita*.





CONCLUSION

From the above result we conclude that A.indica was shows the maximum effects Entomotoxicity against Sitophilus oryzae. O.Sanctum and M.piperita was showing the moderate effects. To prevent the postharvest loss of cereals and grain, after harvesting carrels and grain before storage into the bag are treated with A.indica plant extracts which prevent the future attack of Sitophilus oryzae and post harvest losses

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