

## Short communication

### Biopesticidal property of *Anamirtacocculus*(L.) against rice case worm *Parapoinxstagnalis*Zeller. (Lepidoptera:Pyralidae)

#### Abstract

Rice, *Oryza sativa* L. is the staple food of two thirds of world population. Several insect pests are reported to cause damage to rice crop. Farmers rely mainly on toxic chemicals to protect their crop from these insect pests. Non availability of potent botanicals also forces farmers to depend completely on chemical pesticides. Indiscriminate use of synthetic insecticides leads to several environmental problems, of which resistance and residue are matters of grave concern.

#### Introduction

Of the different larval caterpillars infesting rice, *P.stagnalis* is having a complete aquatic larval stage and uses gills for respiration. It respire from oxygen dissolved in a drop of water which it carries in the case made from rice leaves. Larvae remain inside the cases and float on water to move from one plant to another. It makes sharp right angle cut to rice leaves and make cases. It is difficult to see cases in rice field, but on slight shaking of plant all the cases will drop down to water. Rice in seedling stage is easily attacked by the pest and it is found more in fields with continuous standing water. It moves from one field to another through interconnecting drainage channels. If infestation is unnoticed, plants will be made into mere stumps and crop stand will be lost

Under practical field conditions, it was found that insecticide spray alone cannot manage the pest. Hence farmers pour insecticides directly into the rice fields in larval infested areas. This increases the risk of pesticidal contamination in water bodies which must be addressed seriously. Information regarding effective botanicals against rice case worm is lacking and hence the study was taken to evaluate the potential of locally available botanicals against rice case worm.

#### Materials and method

Botanicals selected for the study under *invitro* conditions are dried and powdered leaves of *Eupatorium odoratum*, *Ageratum conyzoides*, *Gliricidia sepium*, *Calotropis gigantea*, seeds of *Anamirta cocculus* and *Azadirachta indica* (neem cake) and *Madhuca longifolia* (mahua cake). For conducting single dose assay, dried powder (50g) was taken in small muslin cloth bags and immersed in 1000 l water for 24 hrs. Three replications were maintained and 10 third instar larva were released into each replication. Observations were taken on the behaviour and mortality of larvae and was taken till complete mortality was observed in any replication of any treatment.

#### Results and discussion

At one hour after release of live larvae, treatment with anamirta had mortality of 54.99 per cent which was statistically on par with glyricidia (52.78%) and calotropis (50.85%). LarvaNeem cake recorded larval mortality of only 9.46 per cent followed by ageratum (6.75%). Mahua and eupatorium were on par with no mortality. At 2 hours after treatment, anamirta had the highest mortality of 68.85 per cent which was significantly superior to all other botanicals and was followed by glyricidia and (66.15 %) calotropis (66.15%). In treatment with neem cake, mortality increased to 21.15 and in eupatorium treatment, it was 15.30 per cent only. The effect of ageratum and mahua was significantly lower than the other treatments and per cent mortality was only 6.75 per cent. At 3 HAT, anamirta recorded first cent per cent mortality with cumulative mortality of 89.08 followed by glyricidia (83.25) and calotropis (71.57). Neem cake and eupatorium showed statistically similar mortality of 26.57 and 21.15 per cent, respectively.

Multiple dose assay of *A.cocculus* and *G.sepium* the botanicals with promising results from first experiment was done at varying concentrations of 0.5, 1, 2, 3, 4 and 5%. Three replications with ten larvae per replication was used for the study and probit analysis was done to find out LC50 and LC90. Mortality of larvae in Anamirta treatment varied from 3.33 to 56.67 at 1 HAT, and it varied from 10.00 to 66.67 at 2 HAT. At 3 HAT, 96.67 per cent mortality was observed in 5 per cent treated pots. The mortality varied from 20.00 to 86.67 in concentrations varying from 0.5 to 4 per cent. Probit analysis resulted in 4.29, 3.53 and 1.53 per cent concentration as LC 50 at 1, 2 and 3 HAT respectively. Corresponding LC90 values were 26.43, 31.87 and 6.85 per cent respectively. Regarding, glyricidia treatment, mortality at 1 HAT varied from 3.33 to 53.33, at 2 HAT from 10.00 to 66.67 and at 3 HAT from 16.67 to 83.33 per cent respectively. LC50 at 1, 2 and 3 HAT were 4.69, 3.97 and 2.57 per cent respectively and the corresponding LC 90 values were 29.39, 33.02 and 25.13 per cent.

Field evaluation was conducted at RARS Pattambi. One m<sup>2</sup> plots were selected and water level was maintained at 1 cm. 5 cloth bags each with 100 g was placed in the fields for 5 per cent concentration. Other treatments were Bt @ 400g/acre, cartap hydrochloride 7.5% + emamectin benzoate 0.25 % @ 7.5 kg ai/ha, carbosulfan 6% G @ 1 kg ai/ha, cartap hydrochloride 4 % G @ 750 gai/ha. Mortality of larvae and percentage leaf damage was observed for three days after application. At 1 DAT, anamirta and glyricidia treated plots recorded mortality of 41.12 and 39.88 per cent respectively which was statistically on par with cartap (43.73 %) and carbosulfan (40.52 %). The combination insecticide had the highest mortality of 89.48 followed by carbosulfan (40.52). Bt treated plots had mortality of 20.32 per cent. At 2 DAT, mortality of larvae in anamirta treated plots was 59.64 per cent which was statistically on par with carbosulfan (58.25). In Glyricidia treated plots, mortality was 53.42 per cent while in cartap treated plots mortality per cent recorded was 67.61. At 3 DAT, anamirta and carbosulfan recorded statistically similar mortality percent of 61.98 and 58.94 per cent respectively. On comparing the per cent damage of leaves infested, treatment with cartap hydrochloride 7.5% + emamectin benzoate 0.25 % had the lowest damage of 6.17 per cent and in botanical treatment, anamirta had the lowest damage of 18.74 and glyricidia had 20.82 only. The effect of botanicals at 1 DAT was on par with that of carbosulfan (17.75). at 2 DAT, among the botanicals, anamirta had the lowest leaf damage of 20.70 and it was statistically on par with carbosulfan (19.35). Similar trend was observed at 3 DAT with 20.99 per cent leaf damage in anamirta treated plots and 20.09 in carbosulfan treated plots.

The study revealed the potential insecticidal effect of anamirta and glyricidia against larvae of rice case worm. The dried berries of *A. cocculus* have been used in India to stupefy fish (Drury, 1973). Agarwal et al., 1999 reported picrotoxin, a nerve toxin from anamirta, which being a product of biosynthesis are liable to potential degradation. Jyothivel and Paul, 2008 reported the piscicidal property of *A. cocculus*. The larvae of rice case worm use

tracheal gills for respiration. The common mode of respiration might have attributed to the increased efficacy of anamirta against rice case worm. The mosquitocidal property of anamirta against *Aedes aegypti* was reported by Qadir, 2017. The evaluation of the insecticidal property of anamirta against agriculturally important pest is meagre, except a few. Paul et al, 2021 recorded antifeedant effect of *A. cocculus* against *Spodoptera litura*. Mosquito repellent activity of gliricidia was reported by Nazli et al, 2008 whereas Jose and Sugatha (2017) has reported anti feedant activity of methanol extract of *G. sepium* to the tune of 63 per cent.

## Conclusion

The study proved the potential of two botanicals against rice case worm. Unscientific use of chemical insecticides can be checked only with the availability of potent botanical pesticides. Hence research on the pesticidal property of plants has to be conducted on large scale. Potent toxic chemical when they are of biological origin are highly biodegradable. The bright side of this is the shorter residual effect on environment. More research is warranted to fully exploit the pesticidal property of *A. cocculus* and *G. sepium*

## References

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