Use of Plant Products to Control Sitophilus Oryzae, Rice Weevil in Stored Cereals

Dr. Shashi Bala
Associate Professor
Department of Zoology Raghunath Girls Post Graduate College
Meerut Uttar Pradesh India

Abstract
Sitophilus oryzae rice weevil is serious insect pest in stored cereals rice, wheat maize, and normally controlled by application of chemical pesticides which is left over the residue in grains and environment .it affect health of human being there is need to safe and better alternatives methods to used for pest control, biopesticides are good alternative .because of these are cost-effective ,biodegradable, environmentally safe easily available, and less harmful they control insect pest without damaging grains, quality of grains under storage condition or environment[(Kmbrekar etal2022)e.g 90% mortality of insect pest under storage condition exhibited by neem leaf powder ,it contain azadirachitin which stop feeding of insect and slow their growth, it show high mortality rate comparatively other treatment[Kambrekar DN etal 2022] and they play a major role in protection of stored grain, different botanical and Plant powder, oil, plant extract, non volatile oil are plant origin and potential alternative to pest control easily biodegradable, low mammalian toxicity easily degradable less harm to environment. If these used in small quantity (Shaaya *etal.* 1997, Regnault Roger *etal.* 2002 Tapondijou *etal* 2005), They have several advantage then in comparatively to synthetic Pesticides. Because they are plant specific, ecofriendly cost effective, non-persistent in nature, beside they do not Promote resistance. These are new class or safer agent to pest control, Maintain biological diversity of natural enemies of pest.

Key words
Sitophilus oryzae , rice weevil plant products, stored, cereals

Introduction
Sitophilus oryzae is serious insect pest to stored product and it cause serious damage (Qi Yam Tai 1981). Rice weevil *Sitophilus oryzae* is serious insect pest to most of stored cereals and cause severe damage to raw cereal throughout World. In India it is estimated 6.5 percent (Champ &Dyte 1976) whole storage damaged by *Sitophilus oryzae*. In India Few decades so many chemical pesticides were use to control insect pest. but these chemicals develop insect pest resistance, this is found the it almost 500 insect pest species are resisted to one or either most of the pesticides. Use of chemical pesticides causes negative health Impact Different health authorities areRegularly advise to avoid the Use of chemical pesticides because chemical pesticides left their Residue in grain & Environment and Human (Thaung M& Collin 1986 -) There-is Need to find out safe and alternatives such as ecofriendly pesticide has been used in Control by insect pest under storage condition.
According to a research rice weevil *Sitophilus* oryzae is primary global post harvesting insect pest among all stored grain pests((Malestream & Mofokeng
2016).*Sitophilus oryzae insect pest causing* significant loss to stored grains and affect resulting 7.22 percent, grain weight loss 13.63%(Bhargude,Patil etal 2020) infested rice grains not only quantative loss but through a study significant reduction in carbohydrate content(68.15% to58.43% and also change nutritional value ,mineral content it affect seed germinability. It is major threats to security of food in future prospective (Bene etal 2024) , study conducted in Benin weight loss reported after six-
month storage 5.47% in south to 4.07 in centre and in north 1.64%(Arthur etal 2021

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Sitophilus oryzae is serious insect pest to stored product and it cause serious damage (Qi Yam Tai 1981) .losses under storage condition is estimated 9% in developed countries and up to 50% in developing countries which is very big economic losses (Cao Y,Hu &etal)

So there is need to safe and better alternatives methods to used for pest control, biopesticides are good alternative because of these are cost-effective

,biodegradable,environmentaly safe easily available, and less harmful they control insect pest without damaging grains, quality of grains under storage condition or environment[(Kmbrekar etal2022)e.g. 90% mortality of insect pest under storage condition exhibited by neem leaf powder ,it contain azadirachitin which stop feeding of

insect and slow their growth, it show high mortality rate comparatively other treatment[Kambrekar DN etal 2022]

Storage of grains is important for future food security, as its for safety for survival of human being all the natural resources are essential, so for future food demands need to proper preservation techniques should be implanted to future specially in disasters or famines', these technologies to support sustainable growth and human future (1) Storage of grains is important for future food security, as its for safety for survival of human being all the

natural resources are essential, so for future food demands need to proper preservation techniques should be implanted to future specially in disasters or famines', these technologies to support sustainable growth and human future (Abubakar,Ramaiatu etal 2021)

Importance of Plant product in controlling insect pest:

plant those having rich source of secondary metabolite, work as ovicidal, insecticide oviposition deterrents, delayed growth, feeding detriment's maximus plant products are ecofriendly, low toxic biodegradable in environment. Many because have repellent property and they play A Major Role in protection of stored grain, different botanical and Plant powder, oil, plant extract, non-volatile oil are plant origin and potential alternative to pest control easily biodegradable, low mammalian toxicity easily degradable Less harm to environment. If these used in small quantity (Shaaya *etal.* 1997, Regnault Roger *etal.* 2002 Tapondijou *etal* 2005), They have several advantage then in comparatively to synthetic Pesticides. Because they are plant specific, ecofriendly cost effective, non-persistent in nature, beside they do not Promote resistance. These are new class or safer agent to pest

control, Maintain biological diversity of natural enemies of pest. They reduce environment pollution at pale and Human health they are unique due to produce by farmers and small industries (Roy etal, 2005, Scott etal 2008) Phytochemicals and plant derivatives has been investigated from as safer alternatives to chemical pesticides with reduction of environmental Impact and Human healthy Impact. To face these problems many of chemical pesticides like organophosphates carbamates those have been used from earlier times to controlling of stored grains pests. But their wide use

so worsening developing countries where stored grains pests cause very big economic losses [Govindan, Geetanjali S etal 2020].

Scientist has been Investigated study of potential

effectiveness of some plant Product to Control by insect pest *sitophilus oryzae*. These plants derivatives Can the used in Such way

(1) oil of plants
(2) Plant Powder & Leaves
(3) Solvent Extract and isolated Compound.

Role of plant oil in Protection Grain During Storage.

1.Role of Plant oil in Protecting of Grain During Storage

1 Use of Plant Products in Controlling of Rice weevil *Sitophilus oryzae.*

use of some vegetable oil for protection of seed most common culture in Indian Villages. this acceptable. through world-wide such as application of castor oil (3 ml/kg) (*Ricinus communis*), mustard oil, Eruca sativa, Soyabean, Radish (*Raphanus Sativus* has been observe most effective among all the oils, Radish oil, has power effect to Control *Sitophilus oryzae* and enhance seed germination (Ran etal 1988).

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Oil vapours of *Indian Acorus Calamus* Rhizome were Shows toxic effect to *Sitophilus oryzae*. Toxicity is depended upon duration period to exposure 100% mortality in 48 hours has been Exhibited by 2%. *Mentha longifolia sup sp. himalensis*. in this all-maximum composition is pipertone oxides (26.5%), and 58.9% Pipertone oxides and other 6.7%monoterpene hydro Carbon 5.9%. 4-oxygenated monoterpenoids (Melkani etal 1989). 52.5%, mortality at 50%ug / Insect Exposed by *chenopodium ambrosiodes* (Su HCF 1991).

According to study different oils such as mustard oil, sesame, maize, maize, ground gr nut oil, neem oil and piper only Buta oxide exhibit synergetic effect with five different property of insecticides specially mustard oil and except maize oil permethrin against Rice weevil *Sitophilus oryzae* (Prakash etal 1993)Soyabean oil Exhibit highest Reduction of weevils at 330 ml/kg followed coconut oil, and cotton seeds (Dey &Sarup 1993) maximum

effectiveness against Rice weevil *Sitophilus Oryzae* was shown by neem seed oil, than followed by others, rhizome Powder at turmeric, *cassia fistula* Seed leaves of *Vitex Negundo, cassia fistula* seed, fruit peel of dried mandarin (Prakash et al 1993). essential oil of *Mantha arvensis* was most effectively as fumigant against *Sitophilus oryzae*'in stored sorghum seed and this oil was recommended for preservation of sorghum seed (Dey &Sarup 1993). essential oil from other Different plants such as eucalyptus citridora, *citrus sinesis and ocimum basilicum eucalyptus tereticornis* were tested A Laboratory but did not Show any significant Controlling effect (Sarac, Tune 1995). when DDT was mixed with Different vegetable oils, maize, sesame, mustard, ground nut and Neem or poco piperonyl butoxides, Similar, mixture of other essential oil lindane

with neem oil, maize oil or Piperonyl butaoxide demonstrate enhanced effectiveness against stored grain pests (Abdel etal 1991). *Acorus Calamus* oil (Sweet flag) was demonstrate flag ward against *Sitophilus oryzae* Rice

weevil adults at 30°c but not active at very low temp at. high efficacy against *Sitophilus oryzae* was observed in essential oil of *caestilia axillaris* (cis asarane) Exhibit Repellent activity (Schmidt etal 1997, Verma &Chaturvedi 1999)

2 Use of Plant powder & leaves for Controlling of Sitophilus oryzae

LC50 Value of sun dried of Guava and leaves of eucalyptus when mixed up with rice grain are 4.140gm/100 and 2.251gmof grain. both gf ingredients at centration 15g/100gm inhibit progeny development of *s. oryzae* (sharaby1981,1989). powder of *mentha spicata* at concentration mascatasith of 2 /100 w/w in wheat grains Exhibit 100% mortality and provide protection against pest up to 4 weeks (chakraborty1988). Rhizome powder of Acorus *calamus* at 0.1 and 0.2% in milled rice exhibit high mortality rate after 3or 6 month of storage. Only few

offspring emerged at 0.1%. concentration. use of this powder maximum eight month did not affect the cooking quality of rice (Harish, Kulkarni etal 1990). According to some research studies in Nepal *Acorus calamus* (Bajo) (locally available was dried powder then applied at 5og/kg wheat. The result showed the damaged of stored grain was reduced 33%. In Untreated while 5.4%, in control treatment (Paneru etal 1993). Different Naturel powders and extracts are highly efficacy at fighting against *Sitophilus oryzae* (rice weevils. powder of Lavender, horse mint, is corn mint, peppermint, and marjoram (Origanum vulgare all are natural repellents (Iganatowicz 1997) Sallow root (*Decalepis hamilatonin* exhibit 96 to 100% mortality when its powder mixed wheat grain at5 to10% concentration. it thew No progeny development after the treatment. (George Perera etal 1999) curamin is volatile, character, main component present in Miliots (sweet clovers act as repellent activity (Ignatowicz 1997).

Rhizome powder of *Acorus Calamus* altitude area was found Collected from high altitude to slightly less toxic comparatively to that from low altitude sources. at 2% w/w Rate concentration of rhizome powder when applied, resulted in 100% mortality of adult rice weevil after day Exposure at 20°C to 30°c. to protect wheat under storage initial residue of roughly 1300 mg/kg of B Carotene asarone rhizome powder, is need to disinfect grain under field condition at 20°C to 30°045).

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Kernel powder (neem seed *Azadirachita indica*) was applied at rate of 10 g/kg of seed was most effectively protective method, it is ‘slow down infestation to 12.34%. Comparatively to 38% In Untreated Control samples (Imti etal 1997)

3 Isolated Compounds, Solvent Extracts use as Controlling of Rice weevil:

Nudiflorine, a natural Compound which is found in leaves of *Trewria nudiflora* act as powerful insecticide Exhibit up to 90% mortality for specific pests within 12 hours (Chaterji,Das1988'); similarly ground powder of fenugreek Seeds which is specifically prepared with Chloroform Exhibit high toxicity against the Rice weevils, s.oryzae consequently recommended to use 500g of ground
fenugreek seed for every 1oo kg of flour or wheat grain as protective dressing, PU Ram Jamil 1989) Raw Pith raj seed extract from *(Amphimixis Polystachya*) act as
effectively repel and stop pests from eating and slightly toxic. mixing ground, leaves, bark or seeds Into Rice at 2.51. ratio help to protection
of grain by stopping new insecticides from hatching and Reducing damage
(Talaukderetal 1994). Fruit powder of China berry *(Melia azedarach*) reduced Fi generations while its acetone and ether Extract (a stop them entirely and exhibit high mortality. additionally bark Extracts from Melia toosendon
which Contain 675 ppm too sendanin Show 67%, mortality of, *s. oryzae* after 6-week Exposure and Significantly Reduced F1, new adults (Xie Y.S, etal 1995). Methanol and Petroleum, extract of *Ricinus Communis* (Castor) Seed Show significant potential as ecofriendly protection against pests of Stored grains sweets, it shows performance with solvents Extra such as acetone or Chloroform. Results indicates that Extract of these Plants provide effective protection for wheat grains up to 12 weeks (Mahgoub, Ahmed 1996). Researchers have to found Different Natural methods to against *Sitophilus oryzae* Application of chromatography they were isolated Carvacrol from Saw dust of *Thujopsis dolabrata* plant which act as both which is found in certain Sorghum varieties fumigants and insecticides (Abdel kawy etal 1991). Tannins Significantly stop Rice weevil from eating (wongoL.E 1998) while Extract of Neem (RBa) did not Show very 'son at suns active, a very quick action Contact poison. while Hexane Extracted from Eucalyptus "Which Kill only 34%, mortality in *s. oryzae* (Khan &Shajahan1998) Eucalyptus leaves much longer lasting shield Remaing effective Provide up to four weeks. A

conclusion

In recent times with increasing global population, shortage of resources, need to protecting our food supply is critical. There is need to nontoxic pesticides, most of biopesticides commonly used in practice efforts in large scale regarding efforts to required mass production of nontoxic pesticides, biopesticides are used to pest control because they having safety to environment less resistance develop against insect Pest.
Alternative plant based products have take attention due to, ecofriendly,sustainable safe
for human being, currently many essential oils ,plant powder are consider very effective insecticidal, and repellent property.

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