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Effect of different medicinal plant leaves powder on larval mortality of T.granarium

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ABSTRACT-

The Khapra beetle T granarium everts is one of the most destructive insect species of stored food worldwide & is subject to strict phytosanitary legislations In present study ,We evaluated the larval mortality of T,granarium on concrete surface treated with three different medicinal plant leaves (Tobacco leaves, Pudina leaves and Tulsi leaves) The result that ,the medicinal plant leaves powder should high efficiency against T granarium with respect to mortality Tobacco leaves powder most effective medicinal plant powder against T.granarium in compare of pudina &tulsi leaves powder showed no toxicity on treated rat relative to control with respect to biochemical & histological changes The results suggest the ability of using these leaves powder for wheat grains protection as a Safe alternative to insecticides.

KEYWORD-

Pudina, Tulsi, Tobacco, Wheat grain, T. granadium

INTRODUCTION-

Stored products of agricultural and animal origin are attacked by more than 600 species of beetle pests, 70 species of moths, and about 355 species of mites causing quantitative and qualitative losses [1], and insect contamination in food commodities are an important quality control problem of concern for food industries. In industrialized countries like Canada and Australia there is zero tolerance for insects in food grains [2]. *T. granarium* is among the most serious and of widest occurrence in stores in tropical and subtropical regions of Asia and Africa [3] and is common in geographical areas characterized by high temperature and low humidity [4].

Control of stored-product insect populations is primarily dependent upon continued applications of insecticides [2]. In spite of its efficacy, their repeated use for several decades has disrupted biological control system by natural enemies and led to outbreaks of insect pests, widespread development of resistance, undesirable effects on no target organisms, and environmental and human health concerns [2, 5].

These problems have highlighted the need for the development of new types of selective insect-control alternatives. Plants may provide potential alternative to currently used insect-control agents because they constitute a rich source of bioactive chemicals [6]. Since these are often active against a limited number of species including specific target insect, they are often biodegradable to nontoxic products, potentially suitable for use in integrated pest management, and they could lead to the development of new classes of safer insect-control agents. Much effort has, therefore, been focused on plant-derived materials for potentially useful products as commercial insect-control agents. Little work has been done to manage stored-product insects by using aromatic medicinal plants despite their excellent pharmacological actions [7, 8].

Most of the alternatives insecticides substances were tested against insects attacking stored products in order to establish new control practices with lower mammalian toxicity and lower persistence in the environment relative to insecticides. Therefore, studies should conduct not only on the evaluation of botanical extracts against the target pests but also on their safety on human health that are in demand. Although the assessment of enzymes activity in the blood is generally a more sensitive measure of compound toxicity than histopathological changes and can be assessed within a shorter time, the tissue alterations are considered a confirmatory and supporting diagnostic role in the case of certain abnormalities in blood sampling [9].

Therefore, this study attempted to evaluate insecticidal activity of some newly used plant extracts (*C. senna*, *C. gilliesii*, *T. populnea var. acutiloba*, *C. frutescens*, *E. japonicus*, *B. purpurea*, and *C. fistula*) against *T. granarium* in wheat grains with respect to progeny and mortality of the insect adults, to identify the chemical components of the most effective plant extract against *T. granarium*, and finally to evaluate the toxicity of the most effective plant extract on rats with respect to biochemical and histological changes relative to control.

Wheat (Triticum aestivum L.) of Gramineae, is a staple food in the world and said to be originated from south western Asia. In India, it has occupied an area of 29.25 million hectares with an annual production of 85.93 million tonnes (Anonymous, 2010-11). However, Rajasthan occupied 2.39 million hectares area with an annual production of 7.50 million tonnes (Anonymous, 2009-10). Among the wheat growing countries, India ranked second both in terms of area and production (Anonymous, 2008). Wheat is used in various forms, viz., chapaties, dalia, halwa, sweet meat etc. and is consumed by more than one thousand million human beings. In most of the urban areas in the country, the use of baked leavened bread, flakes, cakes, biscuits etc., is increasing at fast rate. Wheat possesses relatively a high content of niacin, thiamine and protein (glutein) which is essential for bakers. A recent estimate by the Ministry of Food and Civil Supplies, Government of India, puts the total preventable post-harvest loss of food grains at tune of 10 per cent of the total production or about 20 million

tonnes which is equivalent to the total food grains produced in Australia annually. The post-harvest loss of food grains in India were 7-10 per cent of the total production from farm to market level and 4-5 per cent at market and distribution levels (Anonymous, 1999). The estimated post- harvest losses during 2003-04 in storage at farm level in wheat was 21.99 per cent or 0.95 kg/q and at retailer level, it was estimated to 9.49 per cent or 0.41 kg/q (Basavaraja et al. 2007)[10]. A survey conducted by Mukherjee et al. (1998) revealed that the annual loss of grains due to insects was estimated to be 5.90 million tonnes, reflecting the intensity of insect pest problems in stores [11]. Stored product insects can cause post harvest losses, estimated up to 9 per cent in developed countries to 20 per cent or more in developing countries (Phillips and Thorne, 2010) [12]. Wheat is attacked by a number of insect pests under storage conditions, out of which the khapra beetle, Trogoderma granarium Everts is one of the world‟s most damaging pests of whole and ground cereals, oilseeds, dry fruits and other stored products. Its immense economic significance is due to its potential to cause huge loss in stored grains through voracious feeding and heating of grains, in larval ability to withstand starvation for up to three years as well as in its ability to live on food with very low moisture content. Beside the quantitative loss, the insect infestation in wheat grains reduce germination and produce unpleasant odour, dirty appearance and abhorrent taste due to contamination with insect fragments and excrement (Khare et al., 1974)[13]. Severe infestations of grain by khapra beetle may make it unpalatable or un-marketable. Grain quality may decrease due to depletion of specific nutrients. Infestation levels of 75 per cent in wheat, maize, and sorghum grains results in significant decreases in crude fat, total carbohydrates, sugars and true protein contents and increases in moisture, crude fiber and total protein contents (Jood and Kapoor, 1993 and Jood et al., 1992, 1996)[14,15,16]. Insect infestation, causing losses are the most serious problems in grain storage, particularly in villages and towns in developing countries because of humid-tropical conditions, poor sanitation and inappropriate storage facilities (Semple, 1985)[17]. In the present scenario, food quality and management efficiency are the most important guidelines for planning and for any decision making process, it is even more important that all people responsible for storage and conservation of agricultural products concentrate their efforts to reduce the high level of product loss. The stored wheat undergoes qualitative and quantitative losses to varying degree, depending upon the storage structures / receptacles used and storage practices followed. Hence, the information about the storage conditions, practices and assessment of losses caused by T. granarium in different storage containers / receptacles is needed. One of the eco-friendly and economic approaches to keep the stored food grains free from insect attack, is the use of the inert materials and plant powders as grain protectants. The growing awareness of environmental hazards due to synthetic insecticides has attracted attention towards products of plant origin. Plant products are known to have many advantages, as they are safe to environment and consumer. Inability of the insect pest to develop resistance against them is an added advantage. There are encouraging reports on the use of certain indigenous plant products as grain protectants and impregnation of packaging materials with plant products. These conventional practices needed scientific evaluation. The efficacy of indigenous plant products, extracts and oils have been evaluated (Jacob and Sheila, 1990; Joseph et al., 1994; Bhargava and Meena, 2002; Sahayaraj and Ravi, 2003 and Naga et al.,

2007)[18,19,20,21,22] but definite information on mortality doses, efficacy of oils and extracts by treatment of packaging materials and direct feeding with the seed and their residual life was meagre, hence needs detailed investigations. Besides these, the need for common wheat varieties to be screened for resistance against the pest was felt. The resistant varieties to the insect pests, if explored; would provide post harvest protection at free of cost.

Singh and Kumari (2005) studied the effect of tulsi (O. sanctum) leaf powder on T. granarium and observed that increased the mortality rate of T. granarium with increasing doses and duration of exposure, however, absolute morality was not observed. Tulsi did not affect the viability of grains.[23]

Kumari and Kumar (1997) studied the efficacy of tulsi leaves on C.chinensis infesting pulse grain. Singh and Kumari(2005) also observed the tulsi leaves powder as grain proctectant against T.granarium.[24]

Evaluated the efficacy of nine indigenous plant products as wheat grain protectants against T. granarium. They reported that use of A. indica oil @ 1 ml, leaf powder @ 15 g, M. azedarach and Ipomea carnea @ 15 g/kg seed minimized the weight loss upto 1.9 to 5.4 per cent by providing maximum protection against T. granarium. Ocimum bacilicum, Solamum dulcamara, Momordica dioica leaf powders @ 15 g, Brassica juncea and Cocus nucifera oils @ 1 ml/kg seeds also gave effective protection of seeds up to four months. These oils and powders prevented egg laying and reduced the adult emergence of beetle up to 6.6 to 30.4 per cent in comparison to 79.5 per cent in control. According to Pfadt (1978), 130 million people could have survive for one yr o the grain destroyed by the stored grain pests.[25] In Egypt a heavy loss in weight of the stored grains has been reported by infestation caused by insects (Koura &HalfNa1962)[26].The pos harvest losses and quality deterioration caused by storage pests are major problem throughout the world. (Hill1990) [27]

Nenaah and Ibrahim (2011) studied the chemical composition and insecticidal activity of certain plants viz., Cinnamomum camphora, Ocimum basilicum, Chenopodium ambrosioides and Pimpinella anisum as powders and essential oils against T. granarium and T. castaneum. They reported that all of the tested botanicals showed insecticidal activities against the test insects in a dose-dependent manner with T. granarium was more susceptible to the tested plant products than T. castaneum. At a concentration of 5 g kg-1 , many of the plant powders caused 100 per cent mortality of both insects after 14 days of exposure. The powders of C. camphora, O. basilicum, and C. ambrosioides were effective against T. granarium, while that of C. ambrosioides caused 100 per cent adult mortality of T. castaneum under the same assays conditions. A dose of 1.50 ml cm-2 of the oils of C. camphora and O. basilicum completely controlled T. granarium, while 100% mortality of T. castaneum adults was recorded with P. anisum oil. A significant and/or complete reduction (100% inhibition) of the F1 progeny of both insects was obtained as a result of parental exposure to the tested botanicals, especially at the highest doses applied. [28]

MATERIALS &METHOD-

Treatment with tobacco leaves powder on T.granarium

In the lab the sample were taken and collected in the laboratory. To observe the effect of tobacco on larval development of T.granarium, experiments were set, in different manners, Larvae were picked up after carefully breaking the grain. Cream colored larvae with dark marks on their anterior tips were removed from their original habit with the help of soft brush. These way altogether 10 larvae were transferred from the original place to the other containers which contained grains treated with different doses of tobacco powder

3 doses (1gm, 2gm and 3 gms) were treated, viewing the nature of the larvae broken grains mostly in or of grains used m this experiment in order to facilitate the survival and growth of larvae controlled also followed the same pattern except the treatment by tobacco .Observations were initially recorded after a treatment of 24 hours for 3 days

Treatment with Pudina leaves powder on T.granarium

Larvae of T.granarium were also studies.It involved treatment of larvae by different doses of Pudina Leaves powder like the previous treatment.

Treatment with Tulsi leaves powder on T.granarium

The three doses of Tulsi leaves powder were mixed with containers test-grains.5 pairs of larvae were released in each container. The observation followed the pattern of experiment.

Observation

Effect of tobacco leaves powder on larval mortality of Trogoderma granarium

Doses	Duration		
	5th Day	10th Day	15th Day
1gm	15%	25%	40%
2gm	50%	65%	85%
3gm	75%	95%	100%
Control		20%	

The Larvel development clearly showed that tobacco leaves powder in quite toxic.The observation was noted at every 5th day interval i.e on the 5th day, 10th day and the 15th day. Three doses were taken for each treatment i.e 1gm, 2gms and 3gms. The observation was recorded on the mortality rates of the larvae. The lowest dose 1gm brought 15% on the 5th day, 25% on the 10th day and 40% on the 15th day

2 gms conc. caused 50% mortality on the 5th day, 65% on the 10th day & 85% mortality on yhe 15th day

The highest dose i.e. 3 gms gave instant mortality 75% on the 5th day, 95% on the 10th day & absolute mortality on the 15th day of exposure.

Effect of Pudina leaves powder on larval mortality of Trogoderma granarium

Doses	**Duration**		
	5th Day	**10th Day**	**15th Day**
1gm	10%	15%	15%
2gm	45%	55%	60%
3gm	60%	75%	80%
Control			

The Larvel development clearly showed that pudina leaves powder in quite toxic.The observation was noted at every 5th days interval i.e on the 5th day, 10th day and the 15th day. Three doses were taken for each treatment i.e 1gm, 2gms and 3gms. The observation was recorded on the mortality rates of the larvae. The lowest dose 1gm brought 10% on the 5th day, 15% on the 10th day and 15% on the 15th day

2 gms conc.caused 45% mortality on the 5th day, 55% on the 10th day & 60% mortality on yhe 15th day

The highest dose i.e. 3 gms gave instant mortality 60% on the 5th day, 75% on the 10th day & 80% on the 5th day

Effect of Tulsi leaves powder on larval mortality of Trogoderma granarium

Doses	**Duration**		
	5th Day	**10th Day**	**15th Day**
1gm			20%
2gm		25%	38%
3gm		60%	68%
Control		10%	

The Larve development clearly showed that tulsi leaves powder in quite toxic. The observation was noted at every 5th day's interval i.e on the 5th day, 10th day and the 15th day. Three doses were taken for each treatment i.e 1gm, 2gms and 3gms. The observation was recorded on the

mortality rates of the larvae. The lowest dose 1gm brought no mortality on the 5th day & the 10th day and 20% on the 15th day

2 gms conc. caused no mortality on the 5th day, 25% on the 10th day & 38% mortality on the 15th day

The highest dose i.e. 3 gms gave instant no mortality on the 5th day, 60% on the 10th day & 68% on the 5th day

RESULT & DISCUSSION-

It was beyond doubt that tobacco irrespective of the grains treated with exerted its effect on the infesting beetles and weevils. Different doses brought different percentages of morality under various durations. Compared with the control even the lowest dose had also toxic effect with the increase in the quantity of tobacco the rate of mortality also increased.

All the dose of tobacco leaves powder were also found more effective on causing morality of T. granadium took place on 3 week of observation. In higher dose i.e. 4 gm absolute mortality occurred on 2nd day Result showed that the lower doses took more time but in higher dose instant death occurred. In the middle dose i.e. 2gm and 3 gms some dead larvae and pupae were found inside the grains.

The given survey show compared to tobacco pudina and tulsi powder, the maximum effect is up to 100% of the powder of tobacco leaves on T.granadium larvae and pudina has up to 80% effect while tulsi leaves have only up to 38% effect

Guthrie et al. (1957) identified containing as the principal nicotine metabolite in the American Cockroach and most likely in the German cockroach as well.[29] Self et al. (1964) examined the fate and disposition of nicotine in the tobacco feeding insects which manage to survive large quantities of nicotine they ingest. It was shown that the tobacco wire worm, Cigarette beetle and grasshopper metabolize nicotine to one, two and four another alkaloids respectively. In the same study the housefly metabolized nicotine to three other alkaloids. In all the above cases at least 70% of the recovered alkaloids were metabolized, (other than nicotine), the principal one corresponding chromatographically to continine (Self et al.1964)[30]

The first is the efficient nicotine excretory system and the second is a metabolic path way from nicotine to cotinine.Guthrie et ai. (1957) Jacob (1992)[31] and Selt et al. (1964) observed cotinine to be nontoxic to insect

Dubey et al. (2011) evaluated natural indigenous plant products viz., M.azadarch, Linum usitatissimum, Cyperus rotundus, Ocimum americanum, Sussia occidentalis, Datura stramonium, A. indica and Carthamus tincotorius against T. granarium and observed that all the grain protectants protected the grain from T. granarium significantly in comparison to untreated check.[32]

Nenaah and Ibrahim (2011) studied the chemical composition and insecticidal activity of certain plants viz., Cinnamomum camphora, Ocimum basilicum, Chenopodium ambrosioides

and Pimpinella anisum as powders and essential oils against T. granarium and T. castaneum. They reported that all of the tested botanicals showed insecticidal activities against the test insects in a dose-dependent manner with T. granarium was more susceptible to the tested plant products than T. castaneum. At a concentration of 5 g kg-1 , many of the plant powders caused 100 per cent mortality of both insects after 14 days of exposure. The powders of C. camphora, O. basilicum, and C. ambrosioides were effective against T. granarium, while that of C. ambrosioides caused 100 per cent adult mortality of T. castaneum under the same assays conditions. A dose of 1.50 ml cm-2 of the oils of C. camphora and O. basilicum completely controlled T. granarium, while 100% mortality of T. castaneum adults was recorded with P. anisum oil. A significant and/or complete reduction (100% inhibition) of the F1 progeny of both insects was obtained as a result of parental exposure to the tested botanicals, especially at the highest doses applied.

REFERENCE

1. S. Rajendran and V. Sriranjini, "Plant products as fumigants for stored-product insect control," *Journal of Stored Products Research*, vol. 44, no. 2, pp. 126–135, 2008.View at: Publisher Site | Google Scholar
2. N. D. G. White and J. G. Leesch, "Chemical control," in *Integrated Management of Insects in Stored Products*, B. Subramanyam and D. W. Hagstrum, Eds., pp. 287–330, Marcel Dekker, New York, NY, USA, 1995.View at: Google Scholar
3. J. H. Viljoen, "The occurrence of Trogoderma (Coleoptera: Dermestidae) and related species in southern Africa with special reference to *T. granarium* and its potential to become established," *Journal of Stored Products Research*, vol. 26, no. 1, pp. 43–51, 1990.View at: Google Scholar
4. I.Ghanem and M. Shamma, "Effect of non-ionizing radiation (UVC) on the development of *Trogoderma granarium* Everts," *Journal of Stored Products Research*, vol. 43, no. 4, pp. 362–366, 2007.View at: Publisher Site | Google Scholar
5. B. Subramanyam and D. W. Hagstrum, "Resistance measurement and management," in *Integrated Management of Insects in Stored Products*, B. Subramanyam and D. W. Hagstrum, Eds., pp. 331–397, Marcel Dekker, New York, NY, USA, 1995.View at: Google Scholar
6. M. Wink, "Production and application of phytochemicals from an agricultural perspective," in *Phytochemistry and Agriculture*, T. A. van Beek and H. Breteler, Eds., vol. 34, pp. 171–213, Clarendon, Oxford, UK,, 1993.View at: Google Scholar
7. W. Tang and G. Eisenbrand, *Chinese Drugs of Plant Origin*, Springer, New York, NY, USA, 1992.
8. T. Namba, *The Encyclopedia of Wakan-Yaku (Traditional Sino-Japanese Medicines) with Color Pictures, Vol I*, Hoikusha, Osaka, Japan, 1993.
9. C. E. Cronelius, W. Charles, and E. Arhode, "Serum and tissue transaminase activities in domestic animals," *The Cornell Veterinarian*, vol. 49, no. 1, pp. 116–126, 1959.View at: Google Scholar
10. Basavaraja, H.; Mahajanashetti, S.B. and Udagatti, N.C. 2007. Economic analysis of post-harvest losses in food grains in India: A case study of Karnataka. Agricultural Economics Research Review, 20: 117-126.

11. Mukherjee, P.B.; Jotwani, M.G.; Sircar, P. and Yadav, R.I. 1998. Studies on the incidence and extent of damage due to insect pests of stored seeds. Indian Journal of Entomology, 30: 61- 65
12. Phillips, T.W. and Thorne, J.E. 2010. Bio-rational approaches to managing stored product insects. Annual Review of Entomology, 55: 375-397.
13. Khare, B.P.; Singh, K.N.; Chaudhary, R.N.; Sengar, C.S.; Agrawal, R.K. and Rai, P.N. 1974. Insect infestation and quality deterioration of grain-I. Germination, odour and palatability in wheat. Indian Journal of Entomology, 36 (3): 194-199
14. Jood, S. and Kapoor, A.C. 1992. Biological evaluation of protein quality of wheat as affected by insect infestation. Food Chemistry, 45: 169-174.
15. Jood, S. and Kapoor, A.C. 1993. Protein and uric acid contents of cereal grains as affected by insect infestation. Food Chemistry, 46 (2): 143-146. Jood, S.; Kapoor, A.C. and Singh, R. 1993. Evaluation of some plant products against Trogoderma granarium Everts in stored wheat and their effects on nutritional composition and organoleptic characteristics of treated grains. International Journal of Pest Management, 39 (1): 93-98.
16. Jood, S.; Kapoor, A.C. and Singh, R. 1996. Effect of insect infestation and storage on lipids of cereal grains. Journal of Agricultural and Food Chemistry, 44:1502-1506.
17. Semple, R.L. 1985. Problems relating to pest control and use of pesticides in grain storage: the current situation in Asian and future requirements, pp.45-75: In B.R. Champ & E. Highley (eds.), Pesticides and Humid tropical grain storage systems. Australian Centre for International Agricultural Research Proceedings 14. Canberra, Australia
18. Jacob, S. and Sheila, M.K. 1990. Treatment of green gram seeds with oils against the infestation of the pulse beetle, Callosobruchus chinensis L. Plant Protection Bulletin, 42: 9-10.
19. Joseph, M.; Mukherjee, S.N. and Sharma, R.N. 1994. Growth inhibition and impairment of reproductive potential in Tribolium castaneum (Herbst) (Coleoptera: Tenebrionidae) by commercially available plant extracts. Insect Science and its Application, 15 (2): 197-202
20. Bhargava, M.C. and Meena, B.L. 2002. Efficacy of some vegetable oils against the pulse beetle, Callosobruchus chinensis L. on cowpea, Vigna unguiculata (L.). Indian Journal of Plant Protection, 30: 46-50.
21. Sahayaraj, K. and Ravi, C. 2003. Repellent property of the plants extracts on Tribolium castaneum Herbst. Journal of Applied Zoological Researches, 14 (1): 118-119
22. Naga, R.P.; Bhargava, M.C. and Choudhary, R.K. 2007. Impregnation of cloth bags with botanical weapons as against the incidence of Tribolium castaneum. Indian Journal of Applied Entomology, 21: 121-122

23. Singh, B.R.S. and Kumari, P. 2005. Efficacy of tulsi leaf powder as grain protectant against Trogoderma granarium. Journal of Applied Biology, 15 (1): 77-78
24. Kumari Punam and Dhyanendra Kumar (1997): Efficacy of Tulsi Leaves on Callosobruchus chinesis (Linn.) infesting pulse grains-, Bull-Env. Sci, Vol.XV; pp- 37-38.
25. Pfadf Robert E (1978): Fundamental of applied Entomology-, McMillan Publishing Co.,INC, U.S.A.,3rd Ed
26. Koura A. and EL. HalfNax, A. (1962): Weight loss in stored grain caused by infestation in Egypt. Bull Soc .Entomol, Egypt; 56:413-417
27. Hill D.S.(1990) : Pest of stored products and their control-Belhaven Press;pp.89-251
28. Nenaah, G.E. and Ibrahim, S.I.A. 2011. Chemical composition and the insecticidal activity of certain plants applied as powders and essential oils against two stored-products coleopteran beetles. Journal of Pest Science, 84 (3): 393-402
29. Gulherie R.L., Ringler and T.G.Bowery (1957): *J.Econ.Entomal:50:821*
30. Self L.S., F.E .Guthrie and E. Hobson (1964); Nature: 204; 300.Sen.V.(Era1984): Ayurved Vigyan, after Sharma.
31. Dubey, R.; Srivastava, S.P.; Azad, B.S.; Singh, S.K.; Pandey, A. and Kumar, R. 2011. Influence of various natural indigenous plant products against Trogoderma granarium Everts on wheat. Trends in Biosciences, 4 (1): 75-76