

Efficacy of *Annona squamosa* against Saw-toothed grain beetle, *Oryzaephilus surinamensis* (L.) in Stored Rice

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Abstract: *Stored grain insects cause serious loss of stored rice and the nutritional value of grain. Use of synthetic insecticides is often beyond the reach of growers and regular and frequent application of these organic pesticides creates lots of problems such as toxicity to non-target species, pest resistance and resurgence. The undesirable effects of synthetic insecticides may be solved with the use of botanicals.*

*Number of plant species possess pest control chemicals but only few of them seem to be ideally suited for management of stored grain pests. These botanicals are active against specific target insects and they are biodegradable and potentially sound for use in pest management. In the present study, alcoholic extracts of leaves and seeds of *Annona squamosa* were evaluated for protection of rice grain against saw-toothed grain beetle, *Oryzaephilus surinamensis* (L). Result demonstrated that alcoholic extract of *Annona squamosa* leaves was found effective for more than 5 days @ 150.0 mg/gm, where as alcoholic extract of *Annona squamosa* seeds was found effective for more than 20 days @ 54.0 mg/gm..*

Keywords: *Annona squamosa, Oryzaephilus surinamensis, Saw-toothed grain beetle, alcoholic extract, rice, storage*

REFERENCES

- [1] Singh, Subhash, "Natural plant products –As protectant during grain storage: A review". Journal of Entomology and Zoology Studies. 5(3); 1873-1885, 2017.
- [2] E. Lampiri, P. Agrafioti, E. Levizou, and C.G., Athanassiou, "Insecticidal Effect of *Dittrichia viscosa* layophilized epicuticular material against four major stored product beetle species on Wheat" . Crop protection.132, 2020.
- [3] S. Muthayya, J.D. Sugimoto, S. Montgomery, and G.F. Maberly, "An over view global rice production, supply, trade and consumption. Ann. N. Y. Acad. Sci. 132, 7-14 (cross ref), 2014.
- [4] Food, Agriculture Organisation of United Nations FAO Statistical Year book, "World food and Agriculture"; Food and Agriculture Organization of the United Nations : Rome, Italy, 2012.
- [5] B.O. Juliano, "Rice in human nutrition"; FAO food and Nutrition Series, No 26; International rice Research Institute: Manila Philippines, 1993.
- [6] Food and Agriculture Organization FAOSTST Database; Food and Agriculture Organization , Rome, Italy, 2013.
- [7] B.R.Champ and Dyte, "Report of the FAO global survey of pesticides, susceptibility of stored grain pests". FAO Plant Prod. and Prot. Rome, Italy 5, 1976.
- [8] B.R. Champ, "Occurance of resistanceto pesticides in grain storage pests. In: pesticides and Humid Tropical grain storage system". B.R. Champ and E. Highly (eds) Proceeding of Intrenational Seminar, Manila, Canbaria ACIAR Proceedings. 14:225-229, 1985.
- [9] F.B. Fishwick, "Pesticide residues in grain arising from post- harvest treatments". Aspects Applied Biology.17:37-46,1988.

- [10] R.; Kumar, A.K. Mishra, N.K Dubey, and Y.B. Tripathi, "Evaluation of *Chinopodium amrocooides* oil as a potential source of antifungal, anti flatoxigenic and antioxidant activity". *International Journal of Food Microbiology*. 115:159-164, 2007.
- [11] Z. Jovanovic, M. Kostic, and Z. Popovic, "Grain protective properties of herbal extract against the been weevil *Acanthoscelides obtectus* Say". *Industrial Crops and Products*. 26:100-104, 2007.
- [12] J. Lu, and Sh. Wu, "Bioactivity of essential oil from *Ailenthus altissima* bark aginst 4 major stored grain insects". *African Journal of Microbiol Research*. 4:154-157, 2010.
- [13] D.K.Weaver, and B.Subramanyam, "Alternatives to pesticides in Stored Product IPM"; Subramanyam, B, Hagstrum, D.W. Eds.; Springer: Boston, USA, 303-320, 2000.
- [14] P. Agrafioti, E. Lampiri, P. Igouenidise, V.T. Karathanos., A. Perdikaris, and C.G.Athanassiou, "Population growth changes in major stored product insect on Rice Fortified with Spermint and Basil". *Agronomy*. 12:2088, 2022.
- [15] Y.Ravi, N.K.Meena, and G. Lal, "Spices: A noval source of Insect pest management". *Journal of Entomology and Zoology Studies*. 7(2): 684-689, 2019.
- [16] G.I. Tlak, and S.A Dar, "Plant allelochemicals as source of insecticides". *Insects*. 12(3): 189, 2021.
- [17] K.N. Singh, and P.K. Shrivastava, "Neem seed powder as a protectant against stored grain insect pest". *Bulletin of Grain Technology*. 18 : 127-129, 1980.
- [18] H.C. Gupta, and S.M. Ahmed, "Evaluation of some non-edible oils grain protectants in wheat and their subsequent effect on germination". *Indian Journal of Entomology*. 50 (2): 147-150, 1988.
- [19] E.Shaaya, U. Ravid, N. Paster, B. Juven, U. Zisman, and V. Pissarev, "Fumigant toxicity of essential oils against four major stored product insects ". *Journal of Chemical Ecology*. 17 (3): 1567-1571, 1991.
- [20] L.Fang, B.Subranmanyam, and H. Frank Arthur, "Effectiveness of spinosad on four classes of wheat against five stored product insects". *Journal of Economic Entomology*. 95 (3) : 640-650, 2002.
- [21] N.K Dubey, B. Shrivastava, and A. Kumar, "Current status of plant products as botanical pesticides in storage pest management". *Journal of Biopesticides* . 1 (2): 182-186, 2008.
- [22] H.D.S. Beckel, I. Lorini and M.N.S. Lazzari, "Rearing method of *Oryzaephilus surinamensis* (L) (Coleoptera:Silvanidae) on various wheat grain granulometry". *Revista Brasileira de Entomologia*. 51 (4), 2007.