INSECTICIDES (incl. Fungicides, Herbicides, Nematicides, Larvicides, etc.)

NPARR 2(3), 2011-0312, Management of Parthenium hysterophorus (Asteraceae) by Withania somnifera (Solanaceae)

The herbicidal activity of Withania somnifera (L.) Dunal against the noxious weed parthenium (Parthenium hysterophorus L.) was evaluated. In a laboratory bioassay, the effect of aqueous, methanol and n-hexane shoot and root extracts of 5%, 10%, 15% and 20% w/v concentrations (on a fresh weight basis) of W. somnifera were tested against the germination and seedling growth of parthenium. In general, aqueous and methanol extracts markedly suppressed the germination, root and shoot growth of parthenium. The shoot extracts were more inhibitory than the root extracts. In a foliar spray bioassay, the aqueous and methanol shoot extracts of 10% w/v (on a dry weight basis) concentration were sprayed on 1-week and 2-week-old pot-grown parthenium seedlings. Two subsequent sprays were carried out 5 and 10 days after the first spray. The aqueous and methanol extracts significantly reduced the length and biomass of parthenium shoots. In a soil amendment bioassay, the crushed shoots of W. somnifera were incorporated in the soil at 1-5% w/w. Parthenium seeds were sown one week after the residue incorporation and plants were harvested 40 days after sowing. All the soil amendment treatments significantly reduced seed germination by 43-89%. The highest dosages of 4% and 5% significantly suppressed the root and shoot biomasses of parthenium. This study concludes that foliar spray of aqueous and methanol extracts, and soil amendment with leaf residue of W. somnifera, can control the germination and growth of parthenium, one of the world's worst weeds [Javaid, A.*, Shafique, S. and Shafique, S. (Institute of Mycology and Plant Pathology, University of the Punjab, Quaid-e-Azam Campus, Lahore, Pakistan), Natural Product Research, 2011, 25(4), 407-416].

NPARR 2(3), 2011-0313, Applications of phytochemical and in vitro techniques for reducing over-harvesting of medicinal and pesticidal plants and generating income for the rural poor

Plants provide medicine and pest control resources for millions of poor people world-wide. Widespread harvesting of medicinal and pesticidal plants puts pressure on natural populations, thus severely compromising their contribution to the income and well-being of traders and consumers. The development of in vitro propagation techniques appropriate for developing countries will provide a robust platform for effective propagation and cultivation of endangered plants. This review focuses on advances in the application of phytochemical and in vitro tools to identify and rapidly propagate medicinal and pesticidal plants. Problems of over-harvesting can be alleviated and ex situ cultivation in agroforestry systems can be facilitated through improving seed germination, in vitro cloning and the use of mycorrhizal fungi. We also present a case for effective use of phytochemical analyses for the accurate identification of elite materials from wild stands and validation of the desired quality in order to counter loss of efficacy in the long run through selection, propagation or ex situ management in agroforestry systems. Future prospects are discussed in the context of medicinal activity screening, sustainable propagation, on-farm planting, management and utilization [Sarasan, V.*, Kite, G.C., Sileshi, G.W. and Stevenson, P.C. (Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, United Kingdom), Plant Cell Reports, 2011, 30(7), 1163-1172].

NPARR 2(3), 2011-0314, Neem based insecticides interaction with development and fecundity of red cotton bug, Dysdercus cingulatus Fab

The red cotton bug, Dysdercus cingulatus, an important polyphagous pest, causes heavy loss to cotton and lady's finger (bhindi) crops which badly affects the economy of poor farmers. In the present study, the impact of different concentrations of neem based insecticides (NBIs) on coupling, moulting, development, hemocyte, fecundity and egg-hatching of D. cingulatus was evaluated. Various concentrations (0.25, 0.5, 1.0 and 2.5%) and doses (2.5 to 20 µL) of NBIs viz. neemark, multineem and neemazal were prepared by diluting them in acetone and applied topically on the dorsum of the body of nymphs and adults and eggs of different age groups.
Fourier transform infrared (FTIR) and X-ray diffraction (XRD). SEM analyses of the synthesized AgNPs were clearly distinguishable measured 35-60nm in size. Larvae were exposed to varying concentrations of aqueous extract of synthesized AgNPs for 24h. The maximum efficacy was observed in crude aqueous, and synthesized AgNPs against C. quinquefasciatus (LC_{50}=27.49 and 4.56mg/L; LC_{90}=70.38 and 13.14mg/L), and against A. subpictus (LC_{50}=27.85 and 5.14mg/L; LC_{90}=71.45 and 25.68mg/L) respectively. The chi-square value were significant at p<0.05 level. These results suggest that the synthesized AgNPs have the potential to be used as an ideal eco-friendly approach for the control of the Culex tritaeniorhynchus and A. subpictus. This method is considered as a new approach to control vectors. Therefore, this study provides first report on the mosquito larvicidal activity of synthesized AgNPs against vectors [Rajakumar, G. and Abdul Rahuman, A.* (Unit of Nanotechnology and Bioactive Natural Products, Post Graduate and Research Department of Zoology, C.Abdul Hakeem College, Melvisharam - 632 509, Vellore District, Tamil Nadu, India), Acta Tropica, 2011, 118(3), 196-203]

NPARR 2(3), 2011-0316, Larvicidal efficacy of Eugenia jambolana Linn. Extracts in three mosquito species at Mysore

The development of resistance to chemical insecticides among mosquito species has been considered as a setback in vector control. So, researchers have diverted their interest towards insecticides of plant origin as an alternative source. Thus the present investigation was undertaken to analyse the larvicidal activity of Eugenia jambolana leaf extracts by employing against the fourth instar larvae of three medically important mosquito species namely Aedes aegypti, Culex quinquefasciatus and Anopheles stephensi at Mysore following the guideline of WHO larval bioassay methodology. The extraction process was carried with a soxhlet apparatus employing petroleum ether, ethyl acetate, acetone and methanol as a solvents. The results shows that among the mosquito species Aedes aegypti was found to be the most susceptible with the LC_{50} value of 40.97 ppm compared to that of Culex quinquefasciatus and Anopheles stephensi with LC_{50} 53.84 and 96.00 ppm, respectively. The crude petroleum ether extract of this plant with good larvicidal efficacy will be considered as a potent
candidate for further analysis [Raghavendra, B.S., Prathibha, K.P., Vijayan, V.A.* (Department of Studies in Zoology, University of Mysore, Manasagangothri, Mysore, Karnataka, India), Journal of Entomology, 2011, 8(5), 491-496].

NPARR 2(3), 2011-0317, Bioactivities of Cocos nucifera L. (Arecales: Areaceae) and Terminalia catappa L. (Myrtales: Combretaceae) leaf extracts as post-harvest grain protectants against four major stored product pests

Compounds extracted from the leaves of coconut palm, Cocos nucifera L. (Arecales: Areaceae) and the Indian almond, Terminalia catappa L. (Myrtales: Combretaceae) were assessed as potential grain protectants against four major pests of stored grains, Sitophilus oryzae (L.) (Coleoptera: Curculionidae), Rhyzopertha dominica (F.) (Coleoptera: Bostrychidae), Tribolium castaneum (Herbst) (Coleoptera: Tenebrionidae), and Callosobruchus chinensis (L.) (Coleoptera: Bruchidae). The crude leaf extracts and their fractions were obtained by solvent elution and bioassayed in the laboratory, focusing on (a) the duration of protection and (b) their effects on progeny production. Results showed that adults of C. chinensis, S. oryzae, and T. castaneum were equally susceptible to the fumigant toxicity of C. nucifera and T. catappa crude extracts as well as their column eluted fractions. On the contrary, adults of R. dominica showed tolerance to all the extracts tested in both fumigation and contact mode bioassays. Cocos nucifera crude extracts were highly effective in offering long-term protection in residual toxicity trials and along with the crude extracts of T. catappa showed strong repellent properties against the tested species except for R. dominica in a Y-tube olfactometer. Generally, the chromatographic fractions of crude leaf extracts eluted with ethyl acetate were significantly more effective than methanol, chloroform or hexane-eluted fractions. Further, all the tested plant extracts demonstrated a negative impact on several biological parameters such as feeding activity and progeny production of the tested species. These results highlight the potential of C. nucifera and T. catappa extracts as potent insecticides, feeding deterrents and progeny production inhibitors and consequently are suitable for the control of pests in stored commodities [Rani, P.U.*, Venkateshwaramma, T. and Devanand, P. Biology and Biotechnology Division, Indian Institute of Chemical Technology, Taranaka, Hyderabad 500607 AP, India), Journal of Pest Science, 2011, 84(2), 235-247].