



## TOXIC AND RESIDUAL ACTIVITIES OF SELECTED INSECTICIDES AND NEEM OIL AGAINST COTTON MEALYBUG, *PHENACOCoccus SOLENOPSIS* TINSLEY (STERNORRHYNCHA: PSEUDOCOCCIDAE) UNDER LABORATORY AND FIELD CONDITIONS

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### ARTICLE INFORMATION

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### ABSTRACT

Laboratory and field studies were carried out during Kharif 2009-10 and 2010-11 to evaluate the efficacy of Commando (97% DF), Confidor (20% SL), Lannate (40% SP), Actara (25 WG) at field recommended doses and neem oil at 1.5 and 2.0% concentrations against cotton mealybug, *Phenacoccus solenopsis* on cotton. Under laboratory environment Commando at recommended dose resulted into 95.2% mortality of the 2<sup>nd</sup> instar nymphs of *P. solenopsis* 72 hours after exposure period. Commando, under laboratory and field conditions, was found not only more toxic but also persisted longer in its efficacy than the rest of the trialed insecticides. Under field conditions, Commando caused 80.6% mortality of the mealybug that was significantly higher than that caused by Confidor (73.29%), Lannate (70.93%), Actara (74.38%) and neem oil (@ 1.5% (40.48%) and 2.0% (52.97%) concentration. Neem oil at both concentrations was less toxic than the rest of the synthetic insecticides; however, it significantly reduced the population of mealybug and remained effective up to more than 72 hours at both concentrations.

**Keywords:** Cotton mealybug, insecticides, neem oil, cotton, efficacy

### INTRODUCTION

Cotton, (*Gossypium hirsutum* L.) plays a pivotal position in the economic development of many countries including Pakistan in terms of source of foreign exchange and employment. Cotton crop is attacked by a variety of insect pests from seedling stage to harvest. About 1326 species of insect pests and mites have been reported to attack cotton crop at various stages of crop growth around the world (Hargreaves, 1948; Manjunath, 2004). However, this crop is attacked by 145 species of insect and mite pests in Pakistan (Husque, 1994). Yield losses due to sucking insect pests are estimated around 4.6%, while chewing pests cause 19.21% loss in the yield of seed cotton (Satpute *et al.*, 1998). Apart from these, recent outbreak of mealybug in Pakistan has caused 14 percent loss to cotton crop (Anonymous, 2005). Cotton mealybug, *Phenacoccus solenopsis* Tinsley (Sternorrhyncha: Pseudococcidae) is a highly polyphagous pest of more than 52 plant families (Arif *et al.*, 2009). It was first recorded in 2005 and since then it has become a serious threat to successful cotton cultivation in all the cotton growing countries of Asia (Ben-Dov, 2004; Wang *et al.*,

2010). It not only causes direct damage to the crop by sucking cell sap from stems, branches, tender shoots, leaves and fruiting parts but also encourages the development of black sooty mould leading to significant reduction in yield. The infected plants have fewer, deformed and smaller bolls. The plants become stunted and in severe cases may die resulting in drastic yield losses. In Pakistan, a survey of cotton growing areas of Punjab showed 28.2% area having mealybug infestation above the threshold level that required control (Anonymous, 2008). The estimated yield losses in cotton due to mealybug were around 12% in 2006 and almost 40% in 2007 in the Punjab province (Kakakhel, 2007).

In recent years, interest is developing in an integrated pest management (IPM) strategy for the control of pest insects. In Pakistan, farmers mainly rely on synthetic insecticides for the management of mealybug but the control of mealybug using foliar insecticides is difficult due to mealy secretion which covers the bodies of adult females. However, the crawler stage is the most vulnerable to these chemicals. Various insecticides, like pro-fenophos, triazophos, carbaryl, thiodicarb, buprofezin and imidacloprid etc. have been recommended by various scientists for the management of

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# Selected Field Laboratory Activities Custom Version

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Thom, Elizabeth Carpenter Tandy, Mary Ruth Colby, United States. Children's Bureau, Ruth S. Bloodgood, 1933 **Rapid Prototyping of Application Specific Signal Processors** Mark A. Richards, Anthony J. Gadiant, Geoffrey A. Frank, 1997-02-28

Rapid Prototyping of Application Specific Signal Processors presents leading edge research that focuses on design methodology infrastructure support and scalable architectures developed by the 150 million dollar DARPA United States Department of Defense RASSP Program The contributions to this edited work include an introductory overview chapter that explains the origin concepts and status of this effort The RASSP Program is a multi year DARPA Tri Service initiative intended to dramatically improve the process by which complex digital systems particularly embedded signal processors are designed manufactured upgraded and supported This program was originally driven by military applications for signal processing The requirements of military applications for real time signal processing are typically more demanding than those of commercial applications but the time gap between technology employed in advanced military prototypes and commercial products is narrowing rapidly The research on methodologies infrastructure and architectures presented in this book is applicable to commercial signal processing systems that are in design now or will be developed before the end of the decade Rapid Prototyping of Application Specific Signal Processors is a valuable reference for developers of embedded digital systems particularly systems engineers for signal processing systems such as digital TV biomedical image processing systems and telecommunications and for military contractors who are developing signal processing systems This book will also be of interest to managers who are charged with responsibility for creating and maintaining environments and infrastructures for developing large embedded digital systems The chief value for managers will be the defining of methods and processes that reduce development time and cost Annual Report of the Dept. of Weights and Measures New Jersey.

Dept. of Law and Public Safety. Division of Weights and Measures, 1929 *Emerging Technologies to Promote and Evaluate Physical Activity* Dan J Graham, James Aaron Hipp, Simon Marshall, Jacqueline Kerr, 2014-10-23 Increasingly efforts to promote and measure physical activity are achieving greater precision greater ease of use and or greater scope by incorporating emerging technologies This is significant for physical activity promotion because more precise measurement will allow investigators to better understand where when and how physical activity is and is not occurring thus enabling more effective targeting of particular behavior settings Emerging technologies associated with the measurement and evaluation of physical activity are noteworthy because 1 Their ease of use and transferability can greatly increase external validity of measures and findings 2 Technologies can significantly increase the ability to analyze patterns 3 They can improve the ongoing systematic collection and analysis of public health surveillance due to real time capabilities associated with many emerging technologies 4 There is a need for research and papers about the cyberinfrastructure required to cope with big data multiple streams processing aggregation visualization etc and 5 Increasingly blurred boundaries between measurement and intervention activity e g the quantified self self tracking movement may necessitate a reevaluation of the conventional scientific model for

designing and evaluating these sorts of studies There have been many recent disparate advances related to this topic Advances such as crowdsourcing allow for input from large diverse audiences that can help to identify and improve infrastructure for activity e g large group identification of environmental features that are conducive or inhibiting to physical activity on a national and even global scale Technologies such as Global Positioning Systems GPS and accelerometry are now available in many mobile phones and can be used for identifying and promoting activity and also understanding naturalistically occurring activity SenseCam and other personal visual devices and mobile apps provide person point of view context to physical activity lifestyle and timing Further multiple sensor systems are enabling better identification of types of activities like stair climbing and jumping that could not previously be identified readily using objective measures like pedometers or accelerometers in isolation The ability of activity sensors to send data to remote servers allows for the incorporation of online technology e g employing an online social network as a source of inspiration or accountability to achieve physical activity goals and websites such as Stickk com enable individuals to make public contracts visible to other users and also incorporates financial incentives and disincentives in order to promote behaviors including physical activity In addition the increasing use of active gaming e g Wii XBox Kinect in homes schools and other venues further underscores the growing link between technology and physical activity Improvements in mathematical models and computer algorithms also allow greater capacity for classifying and evaluating physical activity improving consistency across research studies Emerging technologies in the promotion and evaluation of physical activity is a significant area of interest because of its ability to greatly increase the amount and quality of global recorded measurements of PA patterns and its potential to more effectively promote PA Emerging technologies related to physical activity build on our own and others interdisciplinary collaborations in employing technology to address public health challenges This research area is innovative in that it uses emerging resources including social media crowdsourcing and online gaming to better understand patterns of physical activity

Final Report from the Select Committee on the Conditions and Prospects of the Agricultural Industry and Methods of Improving the Same New South Wales. Parliament. Legislative Council. Select Committee on the Conditions and Prospects of the Agricultural Industry, New South Wales. Parliament. Legislative Council. Select Committee on the Conditions and Prospects of the Agricultural Industry and Methods of Improving the Same, 1922

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