COMPUTERISED RICE PEST MANAGEMENT SAMPLING

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Introduction

This project aims at developing an on-line pest management package for small and large acreage wet paddy ecosystem. As an imperative corollary, to ensure the reliability of estimates, the efficacy, efficiency and practicality of direct visual enumeration were established, especially for direct-seeded rice. Consequently, baseline biological-ecological information of some pestly and predatory species was obtained. This information is essential in developing efficient and reliable sampling schemes that can be transferred to rice farmers, operators, estate managers and IPM practitioners to aid their decision-making system through networking, or as stand-alone files or using CD-ROM.

Materials and Methods

The study areas for baseline information of some pestly and predatory species were established at experimental plots at UPM, and two farmer's plots at Tanjung Karang, Selangor. Direct visual counting on arthropods were performed on transplanted and direct-seeded rice. Subsequently, the numerical information was analysed to obtain species-specific attributes that can be used in developing the sampling protocols. Sequentially based variable-intensity sampling (VIS) plans were chosen. Initially, the algorithms for VIS prototype plans were developed and formulated for the green rice leafhopper, brown- and white-backed planthoppers. These are intended for later development of VIS- Forms, VIS-Tables and VIS-Charts. During development and testing, simulation subroutines were formulated, initially using MS-DOS QBasic based on bootstrap method. Subsequently, the sampling plan program is also being written in MS-DOS QBasic to produce a simple "electronic notepad" enabling interactive decision making in real time, in the actual field environment. Both subroutines will be developed as stand-alone files using Microsoft Visual Basic for Windows-based environment. Definitive field validations are planned to be conducted at FELCRA paddy estate in Seberang Perak, at a later date.

Results and Discussion

A total of 22 arthropod categories were characterised for their population attributes (Hassan 1997; Hassan and Ibrahim 1996) for input into research and applied management models. Attributes of Taylor's Power Law are reasonably stable, hence lending suitability to their integral use as essential parameters in formulating mathematical algorithms and developing/designing procedures for variable intensity sampling plans (Rashid et al. 1998a). Furthermore, our research lines successfully dwelt on, defining biodiversity for identifying strategic species to focus in biocontrol options (Hassan and Rashid, 1997), designing of optimum sample size functions for accurate assessment of population densities (Hassan and Rashid, 1997), and establishment of innovative arthropod action thresholds for 5 pestly and 6 predatory species (Hassan, 1997). These can be used as critical population densities for management decision. Subsequently, a major focus has been to design variable intensity sampling schemes, which obviate the necessity of incorporating prefixed distribution parameters. Notwithstanding the prefixing of distribution parameters, changing and varying population densities and distribution of field populations, are natural phenomena (Hassan and Rashid 1997), which reduce precision and accuracy of population density assessment. These changing parameters consequently increase risk level in management decision schemes. Nevertheless, sampling attributes, obtained through using of Taylor's Power Law coefficients, and as calculated from our earlier researches (Hassan and Rashid 1997), enabled designing of prototype schemes. These schemes compare well in efficiency against fixed-sample size sampling, as tested in a preliminary trial in real field situation and through simulation using a major rice pest, the green leafhopper (*Nephotettix* spp.) (Rashid et al. 1998b). Concomitant with evaluation of field data, changes in biodiversity components (Hassan and Rashid 1997; Hassan et al. 1998) were successfully documented, analysed and inferred. A higher biodiversity of arthropods was recorded in the transplanted paddy ecosystem, compared to the direct-seeded one. Recently, algorithms of an interactive computer programme, written in Microsoft Qbasic, for variable intensity sampling plan, called VISPC (Variable Intensity Sampling for Portable Computer) was documented. This prototype version has indicated that the time to make decision was much less by using the interactive VISPC than when using the hard-copy version. Preparation of algorithms for effective, yet fully interactive, visualisations and file transfer capability for web-based accessibility, are planned for the 1999, 2000 and 2001 periods.

Conclusions

The transition from present heavy-chemical-input practices to environment-friendly practices in crop production necessitates invoking of interactive and real-time-based information technology. Shifting from desktop to palm-top and advancing through networking, can enhance development of functional tools for Advanced Integrated Pest Management (AIPM), especially in rice production.

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