Reviews

Book

Arthropod natural enemies in arable land. III. The individual, the population and the community. Edited by Wilf Powell. (Oxford: Aarhus University Press, 1997). 326 pp. Soft cover £19.95. ISBN 87 7288 673 0.

This is the proceedings of the last of three European Union workshops, held in Aarhus, Wageningen and Bristol from 1993 to 1995, collectively entitled 'Enhancement, Dispersal and Population Dynamics of Beneficial Predators and Parasitoids in Integrated Agroecosystems'. Organized around increasing levels of ecological complexity, the present volume emphasizes efforts to model the interactions of pests and natural enemies. Cereal aphids are the principal pests; the most heavily emphasized natural enemies are carabid beetles and linyphiid spiders, followed by coccinellids and parasitic wasps.

Like the first two volumes, this one contains several methodological papers. They include mark and recapture methods to document mortality, recruitment and displacement of carabids exposed to pesticides (Kennedy & Randall), direct observation of marked carabids to assess movement among habitat patches (Winstone *et al*.), and RAPD-PCR to discriminate aphid populations (Stilmant *et al*.). In a fascinating and entertaining paper, Perry describes a method for determining spatial association from counts of two species. Based on the question of how far sampled individuals would have to move in order to be maximally aggregated or dispersed, it is nicely illustrated by a combination of hypothetical and actual data.

The models fall into two groups, the first being analytical and simulation models. Winder *et al*. model the ability of carabids to detect aphid patches, concluding that results of field trials may have been affected by artificially extreme aphid distributions. Other models in this group include Thomas' on linyphiid dispersal, Skirvin's on climate change and coccinellid population dynamics, Triltsch & Roßberg's on coccinellid predation on cereal aphids, and Mols' on the woolly apple aphid *Eriosoma lanigerum* (Hausemann) and its natural enemies and on carabid foraging and egg production. Topping's metapopulation landscape model examines the potential to augment linyphiid numbers by manipulating patterns of land use. Incorporating details of spider reproduction, mortality and dispersal, disposition of habitats, and nature and timing of husbandry practices, it is transparent, satisfyingly complex, and realistic.

The second group employs the metabolic pool approach. Holst & Ruggle use their wheat–aphid model to explain the method. Subsequent models add major groups of natural enemies: carabids (Petersen & Holst), linyphiids and coccinellids (Axelsen *et al*.), parasitoids (Ruggle & Holst) and pathogenic fungi (Dromph *et al*.). Though varying in their thoroughness and the completeness of available data, as a group they demonstrate the greatest strength of the method: all of the biotic interactions can be modelled with equations of the same general form, allowing sub-models to be added easily.

In a discussion paper, Topping *et al*. review single-species spatially explicit models. Clear and comprehensive, it explains why models are made and reviews the types that have been developed. The authors suggest that a major virtue of spatially explicit models is their ability to incorporate geographic and economic variables relevant to farming.

Sunderland *et al*. conclude the volume with an encyclopaedic catalogue of the biotic interactions comprising agroecosystem dynamics. This barrage of facts provides a powerful argument for modelling: agroecosystem interactions are so numerous and complex that no system can be studied in its entirety experimentally. One underappreciated example: pest dislodgement affects encounter rates not only with ground predators but also with many other natural enemy groups. The authors call for spatial metabolic pool models to facilitate incorporation of more real-world complexity, guild analysis – using representatives of each guild rather than the entire community – to make modelling more manageable, and hierarchical methods to integrate spatially explicit population, community and landscape models.

The volume is nicely produced and the papers read well. Together with the two that preceded it, it is an indispensable summary of the state of research on enhancing natural enemy populations for biological control in temperate agroecosystems.

Matthew H. Greenstone

Electronic Media

TAXAKEY of aphids on the world's crops. By R.L. Blackman, V.F. Eastop and G.G. Kibby. (Wallingford, CAB *International* and London, The Natural History Museum, 1997). CD-ROM £90.00. ISBN 0 85199 172 6.

TAXAKEY is an electronic interactive identification system that has been applied to an updated version of the classic *Aphids on the world's crops* book published in 1984 (ISBN 0 471 90426 0) aimed at non-expert and specialist alike. It is easily installed in Window 3.1x, Window 95/NT and designed to run on a 486 PC with 8 MB RAM and ideally displaying 256 colours, or an Apple Macintosh computer (680x0 or Power PC platform) with a minimum of 256 colours. It comes with a comprehensive TAXAKEY tutorial, and there are basic support modules such as aphid morphology guide, glossary and an extensive bibliography. The body of the work covers over 300 different crops, and some 450 different aphid species. Each species can be called up individually to display a range of information including appearance, host plants, virus transmission, distribution and biology, with references to extend your search if required. For approximately 200 of the 450 species there are photomicrographs, 150 of the 200 showing both apterous adult and alate specimens. The non-aphidologist can enter via the crop list (common and Latin names provided) which will provide a list of aphids found on that crop, and a simple key using easily recognized

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