Abstract

Mussidia nigrivenella Ragonot (Lepidoptera: Pyralidae), an important pest of maize, cotton and Phaseolus bean in West Africa, has never been described as a crop pest from East and southern Africa (ESA). It was hypothesized that in ESA it was either kept under control by natural enemies or that there exist several populations of M. nigrivenella with different host plant ranges. Another possibility is the mis-identification of the Mussidia species in ESA. Studies were conducted in Kenya between 2005 and 2007 to assess the species diversity and host plant range of Mussidia spp. and spatial distribution studies were done on selected host plants. Later, based on the results of host plant range, surveys were conducted between 2006 and 2007 in mid-altitude coastal Kenya to establish a catalogue of parasitoids associated with Mussidia spp. The suitability of stem borers found in Kenya for development of Trichogrammatoidea sp. nr lutea Girault (Hymenoptera: Trichogrammatoidea) and the factors affecting the bionomics of Mussidia sp. in the laboratory were examined. Eight plant species were found to host two Mussidia spp. and six putative morphospecies, which occur sympatrically in the coastal region. The two Mussidia spp. were Mussidia fiorii Ceconni and de Joannis and M. nr nigrivenella. Only one Mussidia sp., M.Jiorii, was found attacking one host plant species in the mid-altitude regions. In general, the host plant range was much narrower than in West Africa. Mussidia nr nigrivenella and Mussidia "madagascariensis" larval distribution was aggregated on Canavalia cathartica Thouars. (Fabaceae) and Strychnos madagascariensis Poir. (Loganiaceae), respectively, while the distribution of M. fiorii adults on Kigelia africana (Lam.) Benth. (Bignoniaceae) was regular. Eight parasitoid species were recovered from Mussidia spp. eggs and larvae and include the trichogrammatid egg parasitoid Trichogrammatoidea sp. nr lutea Girault, a braconid egg-larval parasitoid, Phanerotoma sp., the bethylid Goniozus sp. and the braconid Apanteles sp. Moreover, the ichneumonid larval parasitoid Syzeuctus sp. was obtained from M. fiorii, while the tachinid Leskia sp. was obtained from M, "madagascariensis". Trichogrammatoidea sp. nr lutea, the only parasitoid species which was successfully reared in the laboratory, successfully attacked and developed on eggs of six lepidopteran hosts indicating its potential to exploit other alternate lepidopteran pests of maize in West Africa. Like the parasitoid species, only one Mussidia sp., M.fiorii, was successfully reared in the laboratory and it developed on maize seed-, Canavalia enseiformes L. DC (Fabaceae) seed- and maize leaf-based diets while it could not develop on Mucuna pruriens L. DC (Fabaceae) seed- and C. cathartica seed-based diets. The lower

developmental thresholds for M. fiorii eggs, larvae, pupae and egg to adult were found to be 12.8±0.25°C, 14.4±0.27°C, 11.0±0.03°C and 13.5i0.2rc, respectively, while the thermal constants were 82.0±1.61, 384.6±9.43, 144.9±6.84 and 588.2±10.81 degree days, respectively. Adults started emerging during the last hour of photophase and peak emergence was observed in the 2nd hour of scotophase. Mating activity largely took place between the 4th and 5th hour of scotophase. It can be concluded that there exist several Mussidia spp. in Africa that vary in their host plant range. Overall, mortality caused by parasitoids was negligible hence they were unlikely to explain the population dynamics of the Mussidia spp. in Kenya. The fact that Trichogrammatoidea sp. nr lutea successfully attacks and develops in six lepidopteran hosts, including two Mussidia spp. indicates its potential for use as a biological agent against M. nigrivenella in West Africa. Mussidia fiorii was able to develop on diets based on maize and C. enseiformes. The knowledge on dietary and thermal requirements would optimize mass production of the host and natural enemies. The present study revealed again a serious bottleneck for biocontrol worldwide, namely the proper identification of the pest and natural enemy species as a result of an ever dwindling number of taxonomists. We therefore suggest that molecular (DNA) techniques should be used in addition to detailed morphological examination. In view of the fact that natural control will not be effective in case of accidental introduction of the West African M. nigrivenella into Kenya, we suggest stringent precautions during movement of grains especially maize between the West Africa region and Kenya.