

SPATIAL ARRANGEMENT OF TERRESTRIAL PEST GASTROPODS IN AGRICULTURAL LANDS IN THE NUWARA ELIYA DISTRICT, SRI LANKA

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Eighteen exotic terrestrial pest gastropods have been inadvertently introduced to Sri Lanka. Most of them are confined to the central highlands, especially in Nuwara Eliya (NE) District. Only a few studies have been carried out to investigate their distribution in Sri Lanka. This study was conducted to map the pest gastropods in agricultural lands in NE District. Eighty vegetable, fruit and ornamental flower fields in NE District were sampled from 2017 to 2019 twice a year. Each location was surveyed for gastropods by establishing ten 1 m² sampling plots, and sampling for gastropods was done for a maximum of 15 minutes/plot from 18:30 to 02:00 h. The species density was calculated and distribution maps were prepared for each species using Arc Map 10.4. The distribution of a total of 14 gastropods were documented during this survey, which included five natives (*Macrochlamys indica*, *Cryptozonia bistrialis*, *C. chenui*, *Euplecta emiliana* and *Ratnadvipia irradians*) and four exotic snails (*Bradybaena similaris*, *Allopeas gracile*, *Lissachatina fulica* and *Subulina octona*) and five exotic slug species (*Deroceras laeve*, *D. reticulatum*, *Milax gagates*, *Mariella dussumieri* and *Levicaulis alte*). *D. reticulatum* (9,000 ha⁻¹) and *B. similaris* (5,000 ha⁻¹) were the most dominant species while *M. gagates* was the least dense species (20 ha⁻¹). The densities of sampled pest gastropods were significantly different (one-way ANOVA test; $F = 3.17$, $p < 0.05$). The density of the slugs (2,907 ha⁻¹) was higher compared to the sampled snail (1,842 ha⁻¹) densities. Majority of the exotics were widely distributed throughout the agricultural fields in NE, and most of the exotic snails and slugs were highly abundant around Diagama, Agarapathana, Labukele, Kudaoya, Bogawanthalawa and Ragala. Furthermore, among the pest snails, *A. gracile*, *S. octona*, *L. fulica* and *L. alte* were the dominant species in the dryer parts of NE including Hanguranketha, Walapane and some parts of the Kothmale Divisional Secretariats. The European invaders, *B. similaris*, *D. laeve* and *D. reticulatum*, were common throughout the wet areas of NE District including Ambagamuwa and Nuwara Eliya. Non-endemic native species were found mainly along the margins of the fields and these species were abundant around Bogawanthalawa, Hatton, Nallathanniya and Norwood while the endemics were recorded near Keenagolla, Walapane, Udagama and Palagolla areas. In contrast to the exotic gastropods, the endemic and non-endemic natives showed narrow range distributions especially in dry parts of the district including Hanguranketha and Walapane. Altered environments, such as agricultural lands, provide opportunities of passive dispersal of the exotic terrestrial pest gastropods. This spatial arrangement information can therefore be used to formulate monitoring programmes and strategies to control and prevent the spread of these pests in NE District and thereby minimize the economic damage to agriculture.

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