Abstract

In Sri Lanka export agricultural crops (EAC) such as black pepper, cinnamon, cocoa, clove, nutmeg, cardamom, beetle are becoming more important during the last two decades in comparison to traditional plantation crops such as tea, rubber and coconut. Cinnamon and black pepper are the most important EAC. Existing fertilizer recommendations for most of the EAC are based on inorganic N, P, K, and Mg mixtures and they are not appropriate to cater for nutrient management requirements of organic farming systems of EACs. On this context, application of mycorrizal inoculation techniques are becoming an important plant nutrient management tool, as arbuscular mycorrhizae induced growth improvements are widely reported in many perennial plants. Therefore, a set of experiments were carried out at the EAC Research station with the aim of developing an efficient AM inoculation protocol for pepper rooted cuttings and cinnamon seedlings as a component of integrated plant nutrient management .

As the first step, an experiment was carried out with the objectives of finding the appropriate host crop species and time of uprooting the host crop to obtain maximum possible number of spores in the inoculum of arbuscular mycorrhizae (AM) species *G. mosseae*. Three host crops namely maize (*Zea mays* L.), sorghum (*Sorghum bicolor* L.) and finger millets (*Eleucine coracana.* L) were studied using clay pots. Under local conditions, finger millet was found to be a good alternative as a host crop for mass propagation of AM. This crop would give an additional income as a grain harvest also at 12th week.

Experiment for black pepper (*Piper nigrum* Linn.), was carried out to select a suitable spore density of AM fungus *G. mosseae* for inoculation of black pepper rooted cuttings in the nursery stage using four mycorrhizal inoculum levels of *G. mosseae* namely 25 g (T1), 75 g (T2), 150 g (T3) and 300 g (T4) with a control (T5). Incorporation of the AM inoculum at the rate of 75 g containing approximately 795 (mean) spores with host crop roots and fungal structures in moist soil mixture as medium into one standard size polythene bag before planting a rooted cutting of black pepper was found to be suitable to obtain good quality planting materials for field planting at the 6th month of growth in the nursery. The first AM inoculation experiment for Cinnamon (*Cinnomomum verum* Presl Syn. *Cinnomomum zeylanicum* Blume) was conducted at nursery stage applying objective and treatments similar as black pepper pot trial. Inoculation of cinnamon seedlings with 75 g of above inoculum seems to be appropriate for enhancement of seedling growth of cinnamon.

A large size pot experiment was conducted to investigate the combine effect of Eppawala Rock Phospahate (ERP™) levels and AM (*G. mosseae*) on pepper rooted cuttings beyond the nursery stage. Three P fertility levels (1) F_1-5 µg P/ g soil (2) F_2-50 µg P/ g soil and (3) F_3-100 µg P/ g soil were tested with three mycorrhizal inoculum levels of *G. mosseae* (1) M_1-No Mycorrhizal inoculum, (2) M_2-75 g of Mycorrhizal inoculum and (3) M_3-150 g of Mycorrhizal inoculum in a large size pot experiment with black pepper (local selection MB12) rooted cuttings. Application of moderate rate of P fertilizer (50µg P/ g soil) likely maximized the beneficial effect of abuscular mycorrhiza (*Glomus mosseae*) symbiosis on pepper grown in Reddish Brown Latasolic soil at Matale area in Sri Lanka.

Obsevations warranted further research on rhizoshpere chemistry of pepper and cinnamon in both pot level and the field scale to draw firm recommendation on efficient utilization of applied fertilizer as well as native nutrients along with different AM types.