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Research paper

Tapping the potential of vegetable Amaranth genotype to trap the root knot nematode pest

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ABSTRACT

Nine genotypes of *Amaranthus tricolor* L. and one genotype of Amaranthus cruentus L. were evaluated for susceptibility to root knot nematode, shoot and root traits in a nematode infested plot. A significantly higher proportion of parasitism (1.0) was recorded in four of the plant genotypes. All 10 amaranth genotypes failed to develop root galls by nematodes when cultivated after a fallow crop of African marigold. Three highly susceptible genotypes and one tolerant genotype were further screened in containers filled with sterile soil. The sterile soil was inoculated with the known amount of inoculums of two populations of root knot nematode (*Meloidogyne incognita* Kofoid and White) in the treatments. Two populations of nematodes were native to Old Goa and Varanasi of Goa and Uttar Pradesh states of India respectively. Plants in the un-inoculated control were maintained with sterile soil only. Staining the root samples with acid fuchsin was carried to confirm the presence of egg mass and juvenile nematodes in roots. One genotype of *A. tricolor*, IgAtR-60 (IC0598184) recorded the high degree of nematode parasitism when intercropped in arecanut garden. The genotype also had least reduction in root and shoot traits but remained highly susceptible to inoculation with both Old Goa and Varanasi populations of *M. incognita*. IgAtR-60 (IC-0598184) holds promise in nematode sick plots as trap-catch intercrop after confirmatory investigations.

1. Introduction

The root-knot nematode (RKN) of the genus *Meloidogyne* is the most economically damaging plant-parasitic nematode world-wide (Perry et al., 2009). RKNs cause significant yield losses especially in vegetable crops (Collange et al., 2011). *Meloidogyne incognita* was the most common (70%) species of root knot nematode (Khan et al., 2014) in India.

The *Amaranthus* genus of the family Amaranthaceae comprises plants of economic significance as leafy vegetables, ornamentals, pseudo-cereals and invasive weeds (National Research Council, 1984). The degree of susceptibility among *Amaranthus* spp. varies in response to infestation by a range of species and races of *Meloidogyne* genus. Susceptibility to root-knot nematodes among Amaranth varieties – (*Amaranthus caudatus*, *A. hypochondriacus and A. tricolor*) has been reported in a previous study (Reddy et al., 1980). *A. retroflexus,* the red root pigweed amaranth, is more susceptible to *M. javanica* than to *M. incognita and M. arenaria* (Kokalis-Burelle and Rosskopf, 2012). *A. cruentus* was found to be a poor host for *Meloidogyne* spp. (Rodríguez-Kábana et al., 1988; Nchore et al., 2013; Ntidi et al., 2016).

Root knot nematodes have been reported to infect different host species of Amaranths ranging from vegetables (Bafokuzara 1983; Nchore et al., 2013), ornamentals (Brito et al., 2010) and weeds (Tedford and Fortnum, 1988; Costea et al., 2004; Kaur et al., 2007; Kokalis-Burelle and Rosskopf, 2012). *Amaranthus viridis* L. possess the nematode trapping properties hence grown as intercrop (Afouda et al., 2008; Datta, 2006; Datta et al., 2016) in vegetable garden. Noling and Gilreath (2002) opined the removal of highly susceptible Amaranthus spp. may significantly reduce the population of root-knot nematodes.

The use of chemical control methods have been restricted due to their exorbitant cost, residue and environmental issues. Integrated pest management practices which combine host plant resistance and

Abbreviations: PPP, Proportion of Parasitized Plants; U.P, Uttar Pradesh; ICAR, Indian Council of Agricultural Research; CCARI, Central Coastal Agricultural Research Institute; NBPGR, National Bureau of Plant Genetic Resources

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