EFFECTIVENESS OF RESISTANCE TO THE SOUTHERN ROOT-KNOT NEMATODE (*MELOIDOGYNE INCOGNITA*) IN PEPPER (*CAPSICUM ANNUUM*)

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The southern root-knot nematode [*Meloidogyne incognita* (Kofoid & White) Chitwood] is a major pest of pepper (*Capsicum annuum* L.) in the United States and worldwide. Currently, soil fumigants are used to control root-knot nematodes in peppers. However, the U.S. Clean Air Act mandates that methyl bromide, the leading fumigant used in pepper culture, be withdrawn from production, importation, and use in the U.S. by the year 2000. The pending withdrawal of the methyl bromide registration has focused considerable interest on host plant resistance as a control measure. Bell pepper cultivars with resistance to *M. incognita* are badly needed by the fresh market industry.

'Carolina Cayenne' pepper, which was released by the USDA and Clemson University in 1985, has been reported to exhibit exceptionally high resistance to *M. incognita*. Carolina Cayenne was selected from a 'Carolina Hot' population heterogeneous for several traits, including resistance to *M. incognita*. We conducted a series of greenhouse, microplot, and field studies to characterize the efficacy of Carolina Cayenne's resistance to *M. incognita*. Carolina Cayenne plants exhibited exceptional resistance in all tests; nematode reproduction and galling was always minimal, and fruit yields were never impacted. For example, in a test conducted in an infested field, Carolina Cayenne supported 99.4% fewer root-knot nematodes and outyielded its root-knot susceptible sister line by 339%.

Additional studies were conducted to determine the inheritance of the high level of resistance to *M. incognita* exhibited by Carolina Cayenne. Evaluation of parental, F_1, F_2, and backcross generations of a cross between highly

resistant and highly susceptible lines selected from a heterogeneous Carolina Hot population indicated that the resistance exhibited by Carolina Cayenne is conditioned by two genes, one dominant and one recessive.

The results of our studies indicate that the resistance exhibited by Carolina Cayenne is a suitable alternative to methyl bromide for controlling southern root-knot nematodes in pepper. The availability of a simply inherited source of outstanding resistance makes breeding for southern root-knot nematode resistance a viable objective in pepper breeding programs.