PA-353, PA-398, and PA-426: Southern Root-knot Nematode-Resistant *Capsicum chinense* Jacq. Germplasm Lines

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PA-353, PA-398, and PA-426 are *Capsicum chinense* Jacq. germplasm lines that were released 21 Apr. 1997 by the U.S. Dept. of Agriculture. These germplasm lines are all Scotch Bonnet-type peppers, and they were released to provide superior sources of resistance to the southern root-knot nematode [*Meloidogyne incognita* (Kofoid & White) Chitwood]. The southern root-knot nematode is a major pest of pepper (*Capsicum* spp.), and parasitism of susceptible plants often results in severely stunted plants and greatly reduced yields. Fery and Thies (1997) recently evaluated a large collection of *C. chinense* cultigens (primarily Habanero and Scotch Bonnet types) for reaction to the southern root-knot nematode, and they reported that all Habanero types and all accessions obtained from commercial sources were moderately susceptible or susceptible.

Origin

Each of the newly released germplasm lines originated from bulked populations of individual heirloom cultigens obtained via listings in the Seed Savers Yearbook (Seed Savers Exchange, 1993). The cultigen identifications of the original populations from which PA-353, PA-398, and PA-426 were selected were Red Habanero, Jamaica Scotch Bonnet, and Yellow Scotch Bonnet, respectively.

Description

All three germplasm lines have small, erect growth habits (Fig. 1) and produce bonnet-shaped fruits with three locules. PA-353 plants produce 40 or more fruits; a typical fruit is 3.5

cm long and 6.0 cm wide, and matures to a bright red color. PA-398 plants produce 35 or more fruits; a typical fruit is 3.5 cm long and 6.0 cm wide, and matures to a bright yellow color. PA-426 plants produce ≈40 fruits; a typical fruit is 2.5 cm long and 6.0 cm wide, and matures to a bright yellow color.

Each of the newly released *C. chinense* germplasm lines has exhibited high levels of resistance to southern root-knot nematodes in greenhouse (Table 1) and field studies (Fig. 2). The resistance levels are similar to those ex-

hibited by the *C. annuum* L. cvs. Carolina Cayenne and Mississippi Nemaheart (Fery et al., 1986; Hare, 1966; Thies et al., 1997). Few galls or egg masses are produced on the roots of resistant *C. chinense* plants grown in *M. incognita*-infested soil.

All three of the germplasm lines are Scotch Bonnet-type peppers, and each is recommended for use in plant breeding programs to develop root-knot nematode-resistant Scotch Bonnet type-cultivars. Additionally, these root-knot nematode-resistant *C. chinense* lines are potentially valuable as sources of resistance for development of root-knot nematode-resistant Habanero peppers.

Availability

Small quantities of PA-353, PA-398, and PA-426 seed may be obtained from R.L.F. The genetic materials of these germplasm releases will be deposited in the National Plant Germplasm System where they will be available for research purposes, including development and commercialization of new cultivars. We request that appropriate recognition be made if any of these germplasm lines contribute to the development of a new breeding line or cultivar.

Fig. 1. Typical *Capsicum chinense* plants grown in a field with no known history of infestation by root-knot nematodes. The plant on the left is PA-353, the plant in the center is PA-398, and the plant on the right is PA-426 (tags measure 6.7 × 13.4 cm). Note the small, erect growth habits and the numerous, bonnet-shaped fruits.

Table 1. Average gall index, average egg mass index, and average number of eggs per gram fresh root tissue of the resistant *Capsicum chinense* germplasm lines PA-353, PA-398, and PA-426, and of selected *C. annuum* controls inoculated with the southern root-knot nematode, *Meloidogyne incognita* race 3.^z

Pepper species and accession	Gall index ^y	Egg mass index ^x	No. eggs/g fresh root tissue
<i>C. chinense</i>			
PA-353	1.7	1.8	3068
PA-398	1.3	1.2	2020
PA-426	1.3	1.3	1473
<i>C. annuum</i>			
Carolina Cayenne ^w	1.3	1.4	935
Mississippi Nemaheart ^w	1.5	1.5	1313
Sweet Banana ^v	6.5	6.7	70659
LSD, <i>P</i> ≤ 0.05	0.5	0.5	12816

^zData extracted from a larger table; see Fery and Thies (1997) for complete data and experimental details.

^yRated on a scale of 1 to 9; 1 = no galling and 9 = galls covering at least 80% of root system.

^xRated on a scale of 1 to 9; 1 = no egg masses and 9 = egg masses covering at least 80% of root system.

^wResistant control.

^vSusceptible control.

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Fig. 2. Examples of roots of *Capsicum chinense* plants removed from a field naturally infested by the southern root-knot nematode (*Meloidogyne incognita*). The root system on the **left** is from the resistant germplasm line PA-426, that on the **right** from the susceptible cultigen PA-343. Note the absence of galls on the healthy PA-426 root system and the presence of numerous galls and the extensive stunting of the PA-343 root system.

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