Sweetpotato Speedbreeders

Screening South African sweet potato cultivars for resistance to root-knot nematodes

INTRODUCTION

Plant parasitic nematodes, especially *Meloidogyne* species are considered to be the most important nematodes affecting sweet potato production worldwide. In South Africa a 6% loss, South America 15% and West Africa 24% loss is attributed to *Meloidogyne* spp. (Sasser 1979; Kleynhans, 1991).

South Africa does not have adequate empirically-based data on damage caused by root-knot nematodes on most popular South African sweet potato cultivars, except for Blesbok, which was found to be highly susceptible to *M. incognita* (Kleynhans, 1991).

Therefore, the objective of this project was to screen the most important South African sweet potato cultivars for host-status of three *Meloidogyne* species prevalent in South Africa.

RESULTS

Fifty-six days after inoculation, cultivars had highly significant effects on the reproductive potential of the test nematodes. 'Bosbok' (commercial use) and 'Mvuvhelo' (small-holder use), South African cream-fleshed cultivars, were non-hosts to all *Meloidogyne* species and races. 'Blesbok' (most popular commercial cultivar) showed low host-status to *M. javanica* and *M. incognita* race 4. Local orange-fleshed cultivar 'Bophelo' showed significantly lower reproductive potential than other orange-fleshed cultivars for *M. incognita* race 4 and *M. javanica*.

Table 1. Fresh root mass (FRM), eggs, second-stage juveniles (J2) and reproductive potential (RP) of *Meloidogyne javanica* and *Meloidogyne incognita* races 2 and 4 on sweet potato cultivars (n = 72).

METHODS

Three parallel greenhouse trials were conducted at the University of Limpopo, South Africa. Sweet potato cuttings were established in 20-cm-diameter plastic pots containing 4:1 (v/v) steam-pasteurised river sand and Hygromix-T growing mixture. Each cutting was inoculated with 6000 eggs and second-stage juveniles in parallel trials of the three *Meloidogyne* species and races. Pots were spaced 0.25 by 0.30 m, with cultivars arranged in RCBD, with 6 replicates. At 56 days after inoculation, eggs and juveniles were extracted from 10 g roots. Reproductive potential (RP = eggs + J2/g roots) values were computed and data subjected to ANOVA with SAS software (SAS Institute, 2008).

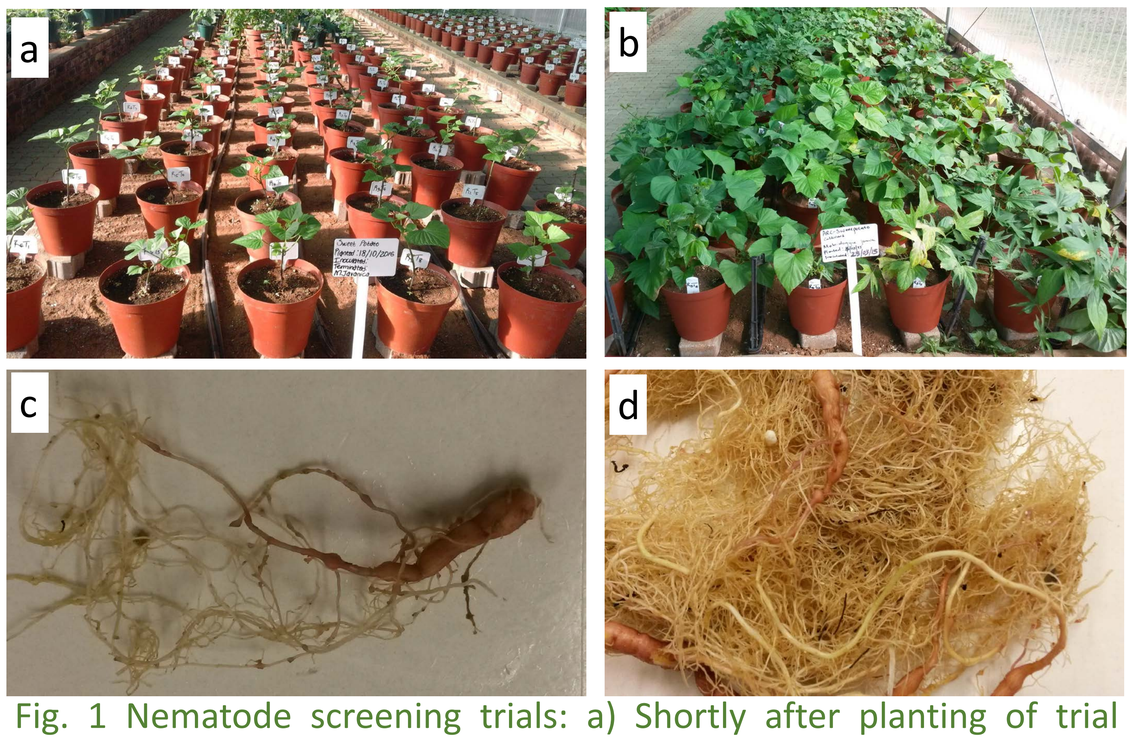

Fig. 1 Nematode screening trials: a) Shortly after planting of trial against *M. incognita*; b) Trial against *M. javanica* race 4 during growing season; c) & d) roots showing infection.

Cultivar	Origin	Flesh Colour	Market	*Meloidogyne javanica*			*Meloidogyne incognita* race 2			*Meloidogyne incognita* race 4		
				Eggs	J2	RP[y]	Eggs	J2	RP[y]	Eggs	J2	RP[y]
Beauregard	USA	Orange	Commercial	1270	138	20.55[a]±8.14[z]	310	162	5.93[a]±0.41	3835	1013	258.93[a]±38.53
W-119	USA	Orange	Informal	260	92	6.59[b]±3.47	188	55	3.23[bc]±0.57	0	0	0.00[c]±0.00
199062.1	CIP	Yellow orange	Informal	238	25	3.18[b]±2.52	248	58	2.44[cd]±0.32	7	22	1.12[b]±0.17
Impilo	ARC	Orange	Informal	218	28	3.71[bc]±2.44	183	70	3.82[b]±0.93	13	13	25.77[b]±2.48
Ndou	ARC	Cream orange	Informal	192	23	2.16[cd]±0.70	165	60	2.00[d]±0.18	43	21	1.28[b]±0.19
Bophelo	ARC	Orange	informal	87	12	1.35[cd]±0.43	198	60	1.68[d]±0.32	65	28	2.18[b]±0.47
Lethlabula	ARC	Cream	Informal	172	27	1.91b[cd]±0.40	177	58	2.03[d]±0.11	237	38	9.61[b]±1.17
Ribbok	ARC	Cream	Commercial	18	17	0.46[d]±0.35	180	47	2.00[d]±0.25	2	13	1.02[b]±0.31
Monate	ARC	Cream	Informal	307	22	3.38[bc]±5.77	147	38	1.68[d]±0.27	38	20	1.37[b]±0.32
Blesbok	ARC	Cream	Commercial	15	17	0.35[d]±0.01	130	28	1.78[d]±0.32	50	12	2.45[b]±0.55
Bosbok	ARC	Cream	Commercial	0	0	0.00[e]±0.00	0	0	0.00[e]±0.00	0	0	0.00[c]±0.00
Mvuvhelo	ARC	Cream	Informal	0	0	0.00[e]±0.00	0	0	0.00[e]±0.00	0	0	0.00[c]±0.00

[y]Reproductive potential (RP) = (Eggs + J2s)/Fresh root mass. [z]Column means followed by the same means were not different according to Waller-Duncan multiple range test at 5% level of probability

RELEVANCE/POTENTIAL IMPACT

The Sweet Potato Programme (SPP) of the ARC aims at high β-carotene content, with selections primarily focused on high yield, storability, sweetness and/or dry taste (Laurie et al., 2015). The identification of tolerant/resistant sweet potato cultivars to the three *Meloidogyne* species prevalent in South Africa can increase profitability to both commercial and small-holder farmers. The estimated annual sweet potato loss due to damage caused by root-knot nematodes, together with Reniform nematodes, amounts to 2.6 billion U.S. dollars.

CONCLUSIONS

Cultivars 'Mvuvhelo' and 'Bosbok' were non-hosts to all *Meloidogyne* species and races.

These preliminary findings revealed the existence of resistant cream-fleshed sweet potato cultivars, however, additional work is necessary to confirm whether the nematode resistance allows for introgression through hybridization.

Identified sources of resistance are being targeted for biofortification intended to ameliorate malnutrition in Southern Africa.

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