

Screening of Ashwagandha germplasms/varieties against *Meloidogyne* spp.

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ABSTRACT : There are few reports on occurrence of root-knot disease (*Meloidogyne* spp.) on ashwagandha. Ashwagandha cultivar WS 90-100, WS 90-104 and WS 90-117 were found resistant to *M. incognita* and WS 90-135 was moderately resistant to *M. javanica* are reported. Hence, with a view to search resistant genotype/ variety against *Meloidogyne* spp., present study was envisaged.

Key Words : Screening, Ashwagandha, germplasms, varieties, *Meloidogyne* spp.

Table-1: Screening of ashwagandha varieties against *Meloidogyne* spp.

Germplasm /varieties	RKI (0-5)*	Root population/ plant		Soil nematode population	Total nematode population	Reaction
		Females (different stages)	Eggs			
Varieties (V)						
DWS 33 (V ₁)	2.80	2.60 (397.10)	2.77 (587.84)	2.50 (315.23)	3.94 (8708.64)	MS
DWS 44 (V ₂)	4.00	2.69 (488.78)	2.83 (675.08)	2.61 (406.38)	4.02 (10470.29)	S
DWS 55 (V ₃)	2.60	2.58 (379.19)	2.87 (740.31)	2.61 (406.38)	3.92 (8316.64)	MS
DWS 58 (V ₄)	2.40	2.56 (362.08)	2.76 (574.44)	2.48 (301.00)	3.90 (7942.28)	MS
DWS 142 (V ₅)	0.20	2.40 (250.19)	2.68 (477.63)	2.34 (217.78)	3.72 (5247.07)	R
IC 28396 (V ₆)	1.00	2.51 (322.59)	2.72 (523.81)	2.37 (233.42)	3.86 (7243.36)	R
IC 283662 (V ₇)	4.20	2.68 (477.63)	2.91 (811.83)	2.65 (445.68)	4.02 (10470.29)	HS
IC 283942 (V ₈)	4.20	2.12 (130.83)	2.32 (207.93)	2.61 (406.38)	4.01 (10231.93)	HS
IC310595 (V ₉)	3.40	2.62 (415.87)	2.80 (629.96)	2.55 (353.81)	3.96 (9119.11)	S
IC 310620 A (V ₁₀)	1.60	2.53 (337.84)	2.73 (536.03)	2.40 (250.19)	3.90 (7942.28)	MR
IC 310620 B (V ₁₁)	2.80	2.59 (388.05)	2.78 (601.56)	2.54 (345.74)	3.92 (8316.64)	MS
JA 20 (V ₁₂)	4.20	2.66 (456.09)	2.79 (615.60)	2.64 (435.52)	4.01 (10231.93)	HS
A 1 (V ₁₃)	4.80	2.92 (830.76)	3.42 (2629.27)	2.86 (723.44)	4.08 (12021.64)	HS
A 2 (V ₁₄)	4.00	2.64 (435.52)	2.81 (644.65)	2.60 (397.11)	4.01 (10231.93)	S
A 3 (V ₁₅)	1.00	2.51 (322.59)	2.73 (536.03)	2.39 (244.47)	3.86 (7243.36)	R
A 6 (V ₁₆)	3.00	2.62 (415.87)	2.78 (601.56)	2.51 (322.59)	3.94 (8708.64)	MS
A 9 (V ₁₇)	0.60	2.47 (294.12)	2.64 (435.52)	2.51 (322.59)	3.84 (6917.31)	R
A 11 (V ₁₈)	1.40	2.53 (337.84)	2.74 (548.54)	2.47 (294.12)	3.88 (7584.78)	MR
A 13 (V ₁₉)	4.60	2.76 (574.44)	3.22 (1658.59)	2.96 (911.01)	4.06 (11480.54)	HS
A 14 (V ₂₀)	0.60	2.43 (268.15)	2.59 (388.05)	2.48 (301.00)	3.82 (6605.93)	R
A 18 (V ₂₁)	4.40	2.70 (500.19)	2.95 (890.25)	2.76 (574.44)	4.02 (10470.29)	HS
A 22 (V ₂₂)	3.60	2.63 (425.58)	2.79 (615.60)	2.56 (362.08)	4.00 (9999.00)	S
A 24 (V ₂₃)	4.60	2.71 (511.86)	2.92 (830.76)	2.66 (456.09)	4.02 (10470.29)	HS
A 25 (V ₂₄)	0.40	2.13 (133.90)	2.31 (203.17)	2.28 (189.55)	3.80 (6308.57)	R
A 26 (V ₂₅)	4.20	2.64 (435.52)	2.85 (706.95)	2.63 (425.58)	4.01 (10231.93)	HS
A 27 (V ₂₆)	4.00	2.63 (425.58)	2.80 (629.96)	2.60 (397.11)	4.01 (10231.93)	S
A 28 (V ₂₇)	0.20	2.20 (157.49)	2.38 (238.88)	2.25 (176.83)	3.70 (5010.87)	R

S. Em ±	0.94	0.12	0.08	0.09	0.04
C. D. 0.05	16.99	0.34	0.21	0.27	0.10
C.V. %		10.54	6.11	8.33	2.08

*0 = Free; 5 = Maximum disease intensity.

Figures in parentheses are re-transformed values log x+1 transformation.

R-Resistant,

MR- Moderately resistant,

MS- Moderately susceptible,

S- Susceptible,

HS- Highly susceptible.

Ashwagandha [*Withania somnifera* Dunal.] is a medicinal plant. Species of Solanaceae family is an adoptogenic herb and its roots, seeds and leaves are used in Ayurvedic and Unani medicines (Nigam and Kandalkar, 1995). It is cultivated over an area of 10,780 ha with a production of 8,429 tons in India. While an annual demand has increased from 7028 tons (2001-02) to 9127 tons (2004-05) necessitating to increase its cultivation and higher production. Among the traded medicinal plants in India, ashwagandha stands second in trading with a worth of Rs. 100-120 million next to Amla (Tripathi *et al.*, 1996).

Materials and Methods

Study was conducted to locate the source of resistance ashwagandha germplasms/varieties against *Meloidogyne* spp. Twenty-seven germplasm /varieties obtained from Directorate of Medicinal and Aromatic Plant Research, (DMAPR) ICAR, Boriavi and

AICRP on Medicinal and Aromatic Plants, AAU, Anand were tested in earthen pots of 15 cm diameter using Completely Randomized Design

The pots were washed with water and disinfected with 4% formaldehyde (Formalin 40 EC). After drying, pots were filled with stream sterilized soil @ 1.5 kg/pot (coarse sand 1.3%, fine sand 63%, silt 15% and clay 20%). Three seeds of each variety (Table-1) were seeded in the center of each pot. On germination, plants were thinned down to one/ pot. Each plant was inoculated with 1500 J₂ of *Meloidogyne* spp. (mixed population of *M. incognita* and *M. javanica*) extracted from the egg masses from natural infected crop 30 days after sowing by making ring around the stem. The pots were kept in net house. Each treatment was repeated five times. Plants were watered regularly and protected from pests and diseases. Plants were removed carefully after 60 days of nematode inoculation and roots were washed with water to make free from the soil. Finally, the observations on root-knot index and root and soil nematode population were recorded and data were analysed statistically using appropriate method.

Results indicated that all twenty-seven germplasms/varieties were attacked by *Meloidogyne* spp., of which, varieties/germplasms viz. A 28 (V₂₇) and DWS 142 (V₅) had lowest root-knot index and nematode population but did not differ significantly from A 25 (V₂₄), A 14 (V₂₀), A 9 (V₁₇), A 3 (V₁₅) and IC 18396 (V₆), all giving resistant reaction. Maximum root-knot index was recorded in A 1 (V₁₃), A 13 (V₁₉), A 24 (V₂₃), A 18 (V₂₁), A 26 (V₂₅), IC 283662 (V₇), IC 283942 (V₈), JA 20 (V₁₂), A 2 (V₁₄), A 27 (V₂₆) and DWS 44 (V₂), and they were in the range of susceptible to highly susceptible types. Minimum numbers of females were observed in variety IC 283942