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Effect of Plant Age on Resistance to Aphids (*Aphis craccivora* Koch) and Rosette Virus in Groundnut

H Bottenberg[1] and **P Subrahmanyam** (ICRISAT, PO Box 1096, Lilongwe, Malawi; 1. Present address: Department of Natural Resources and Environmental Sciences, University of Illinois, 260 ERML, 2101 W. Gregory Drive, Urbana, IL 61801, USA)

Rosette, an important virus disease of groundnut in Africa, can be contained by planting resistant groundnut cultivars. Resistance to rosette is most effective (Subrahmanyam et al. 1994) but resistance to the vector *Aphis craccivora* Koch (Padgham et al. 1990) can also lower disease incidence and provide additional protection (Wightman et al. 1990). Plant age can affect host plant resistance. Older plants are generally less susceptible to virus infection and aphid infestation than younger plants (Gibbons and Farrell 1966, Farell 1971). In addition, infected plants may support larger aphid populations than healthy plants.

We tested the effects of plant age and resistance to aphids or rosette disease. The preliminary studies on vector population growth and disease expressions were conducted in greenhouse at Chitedze, Malawi. Five long-duration, virginia type cultivars were used: Chalimbana and CG7 (susceptible to both virus and aphids); RMP 12 and ICGV-SM 90704 (resistance to rosette but resistant to aphids). Three plant ages tested were: 14, 23, and 43 days after sowing (DAS). There were a total of 10 plants for each of treatment, arranged in a split-plot design. The impact of rosette infection on aphid population growth, and the effect of aphid feeding on rosette symptom expression was also tested. Aphid infestation was done in the early morning with a fine painter's brush in groups of three 4th instar nymphs per plant. Viruliferous and healthy aphids were obtained from ICRISAT's stock cultures maintained on a susceptible Malimba cultivar at Chitedze in separate greenhouse. Three days after infestation, the plants with viruliferous aphids were divided into two groups. In one group all plants were sprayed with Actellic® 50EC (pirimiphos-methyl) to kill the aphids; in the other group the aphids were left undisturbed and allowed to multiply. All plants were covered with perforated plastic sleeves (Krisp® bags) and arranged in a single greenhouse. Aphid counts were made every other day from 7th until 25th days after infestation when all plants were sprayed with Actellic® 50 EC. The plastic sleeves were removed and rosette symptom expression was followed for another 15 days. Aphid infestation was expressed as the cumulative total counted from 7 until 25 days after infestation; virus infection as the percentage plants with visual symptoms at 40 days after infection. Temperature varied from 15–35°C; RH from 70–100%. The data were analysed using Genstat® 5 for Windows® 3.2 (Lawes Agricultural Trust, Rothamsted Experimental Station, UK).

Table 1. Cumulative aphid count per groundnut plant at 25 days after infestation, and rosette infection at 40 days after inoculation as affected by plant age and cultivar.

	Cumulative aphid count	Rosette infection treatment (%)
Plant age at infestation (DAS)		
14	2159	47.7
23	1711	50.0
43	1242	36.8
Cultivar		
CG 7	1727	80.7
Chalimbana	1702	78.2
EC 36892	1511	44.4
ICGV-SM 90704	1738	17.9
RMP 12	1707	0.0
LSD (5%)	174	14.8

Plant age. Aphid populations were largest on plants infested at 14 DAS, followed by plants infested at 23 and 43 DAS. Clearly, young plants are physiologically more suitable to aphid development and reproduction than older plants. Rosette infection was significantly lower in the 43 DAS group than in the younger age groups.

Cultivar. Aphid population growth was lowest on EC 36892, an aphid-resistant line. The other cultivars showed

statistically similar population levels (Table 1). Rosette infection was highest on CG 7 (80.7%) and Chalimbana (78.2%), both susceptible to aphids and rosette. Rosette infection was considerably lower in EC 36892 (44.4%). This difference cannot be explained by the anti-xenosis mechanism of resistance in this variety because the plastic sleeves prevented aphids from crawling away and settling on preferred cultivars. Perhaps the mode of feeding was affected in such a way that the probability of infection was reduced. The rosette-resistant lines ICGV-SM 90704 ranked fourth with 17.9% infection while RMP 12 did not show any rosette symptoms.

Cumulative aphid counts were somewhat higher on rosetted plants (1781) than on healthy plants (1615) ($LSD_{5\%} = 86$) suggesting that infected plants were nutritionally more favorable to aphid development than healthy plants. Rosette infection was also higher when aphids were allowed to remain on the plant and multiply for an additional 25 days following the 3-day inoculation feeding period (54.4%) compared to plants where the aphids were killed after inoculation feeding (37.9%) ($LSD_{5\%} = 7.6$). This may indicate that the optimal inoculation feeding period was in this experiment was longer than 3 days. There was no interference with symptom development although the plastic sleeves made visual assessment of symptoms difficult.

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Performance of Insect Pest Resistant Groundnut Varieties from ICRISAT in Indonesia

Novita Nugrahaeni, Joko Purnomo, Astanto Kasno, and **Abdul Munip** (Research Institute for Legumes and Tuber Crops, PO Box 66, Malang 65101, Indonesia)

Fifteen ICRISAT insect pest resistant varieties and an Indonesian improved cultivar "Mahesa" were evaluated at Muneng Research Station (10 masl). The soil type is Mediteran Ortic. The plot size consisted of 4 rows of 5 m

Table 1. Percent leaf damage caused by thrips on groundnut genotypes, Muneng, Indonesia, dry season 1995 and 1996.

ICGV genotype	Percent leaf damage at 28 DAS 1995	1996	Average	42 DAS 1995	1996	Average
90226	35.5	27.7	31.6	39.3	40.4	39.9
90227	38.4	26.4	32.4	43.0	38.0	40.5
90228	32.2	25.8	14.5	45.2	38.8	42.0
90261	29.1	30.5	29.8	37.8	46.4	42.1
90265	23.3	11.9	17.6	29.1	14.2	21.7
91167	21.9	9.7	15.8	19.7	11.4	15.6
91171	31.1	25.8	28.5	35.6	32.5	34.1
91173	33.0	24.8	28.9	39.4	33.8	36.6
91176	22.1	12.0	17.1	25.4	16.6	21.0
91180	33.3	29.2	31.3	34.4	33.3	33.9
91185	32.7	25.9	29.3	39.1	31.8	35.5
91190	26.6	17.9	22.3	32.8	29.2	16.5
91192	25.3	18.0	21.7	30.5	20.3	25.4
91205	33.4	22.3	27.9	41.0	27.4	34.2
91215	42.5	24.5	33.5	36.4	37.0	36.7
Mahesa	40.8	15.6	28.2	47.0	23.0	35.0
Average	31.3	21.8	26.6	36.0	29.7	32.9
SE	±0.882	±0.714		±0.956	±0.643	
CV (%)	16.4	12.6		24.6	14.8	