

Studies on the Varietal Resistance of Pigeon pea (*Cajanus cajan* L.) to Sterility Mosaic Disease

BY

K. S. SUBRAMANIAN, G. SATHIABALAN SAMUEL, R. JANARTHANAN and T. K. KANDASWAMY

ABSTRACT

In the varietal screening studies, all the 549 varieties of pigeon pea available in Tamil Nadu Agricultural University were found susceptible to sterility mosaic disease and they were grouped into three categories *viz.*, mild, medium and severe depending upon the type of symptoms. It has been confirmed that the eriophyid mite *Aceria cajani* is the vector of pigeon pea sterility mosaic virus.

Sterility mosaic disease in pigeon pea is very destructive and reduces the yield of the crop considerably. The viral nature of this disease was reported by Capoor in 1952. Seth (1962) found that the disease was transmitted by an eriophyid mite at New Delhi and later identified the eriophyid mite vector as *Aceria cajani*. Recent findings have confirmed the transmission of this disease by the eriophyid mite *Aceria cajani* (Janarthanan *et al.*, 1972). Seth (1962) tested 18 varieties and found them susceptible to the disease. During 1960 Kandaswamy and Ramakrishnan reported the disease in an epiphytotic form affecting all the 176 varieties of pigeon pea grown at Coimbatore.

Under a P. L. 480 Project on pulse viruses initiated during 1970 at the Tamil Nadu Agricultural University, Coimbatore, efforts were made to screen all the available varieties of pigeon pea for their susceptibility to this disease especially when a large

number of a germ plasm collections are available in the country. The results of these studies are presented here.

MATERIAL AND METHODS

Screening different pigeon pea varieties to sterility mosaic disease was undertaken by resorting to conventional side grafting of healthy plants with disease infected scions. This method was employed in the beginning when the mode of transmission was definitely not known. Later, a simpler method devised was employed, when the vector of the disease (*Aceria cajani*) was known. In this method pigeon pea plants were raised in pots and maintained under glass house conditions. When the plants were about 30 days old, they were tied with infected branches of the susceptible variety CO. 1 pigeon pea, having the eriophyid mites, whose presence was confirmed under a stereoscopic microscope. This technique was preferred since it was less laborious and the incubation period (7-20 days) was also

This research has been financed in part by a grant made by the USDA under P. L. 480, Tamil Nadu Agricultural University, Coimbatore 641003.

found to be less than incubation period required by graft-inoculated plants.

RESULTS AND DISCUSSION

In the varietal screening studies, 549 germ plasm types obtained from the pulses section of the Agricultural College, Coimbatore excluding the 176 varieties tested earlier by Kandaswamy and Ramakrishnan (1960), were tested artificially. All the varieties were found to be susceptible and out of the varieties tested, 242 types exhibited mild, 210 medium and 97 severe type of reactions to the disease. The varieties grouped as 'mild' exhibited faint mosaic mottling and yellowing of leaves and the number of leaves affected were either few or only one in a branch with occasional reduction in the production of flowers. The varieties grouped as 'medium' exhibited characteristic mosaic pattern, a little reduction in the size of leaflets and slight stunting of the affected plants. Varieties which exhibited crinkling of leaves, clustering of leaflets at the apex of the plants, marked stunting and complete sterility of the plants, with no seed setting, were grouped as exhibiting 'severe' symptoms. The symptoms developed in 7 to 20 days with a large number of plants exhibiting symptoms in 9 to 13 days. The variation in days may probably be due to the number of mites present in the infected branches used. The following is the list of types under the three categories:-

Mild infection types :

(i) *Tested through grafting*

P. 17, 21, 131, 137, 140, 181, 208, 253, 272, 458, 482, 535, 537, 543, 627,

655, 686, 715, 827, 846, 960, 969, 984, 1001, 1004, 1005, 1019, 1022, 1032, 1033, 1036, 1067, 1093, 1108, 1129, 1134, 1135, 1150, 1160, 1164, 1185, 1224, 1225, 1229, 1284, 1285, 1292, 1296, 1316 and 1325.

(ii) *Tested by using mite vector*

P. 1, 3, 12, 18, 20, 25, 28, 30, 41, 43, 44, 47, 53, 71, 90, 104, 107, 116, 117, 124, 127, 132, 135, 145A, 148, 151, 153B, 168, 180, 207, 207B, 209, 217, 218, 220, 223, 225, 225A, 225B, 226, 228, 231, 237, 245, 248, 273, 283, 325, 335, 343, 349, 350, 352, 356, 369, 370, 390, 401, 403, 406, 414, 423, 453, 468, 470, 477, 510, 512, 519, 523, 530, 532, 534, 553, 567, 577, 583, 618, 634, 636, 641, 653, 666, 677, 682, 699, 729, 746, 786, 793, 816, 817, 823, 833, 849, 858, 871, 873, 875, 897, 901, 901A, 913, 918, 923, 925, 932B, 933, 938, 942, 948, 949, 952, 952D, 958, 961A, 962, 963, 964, 967, 968, 971A, 972, 976, 980, 981, 983, 983A, 986A, 987, 989, 992, 998, 1007, 1007B, 1009, 1009B, 1013, 1015, 1017, 1017A, 1023A, 1024A, 1028, 1036, 1038, 1052, 1055, 1069, 1072A, 1092, 1094, 1113, 1131A, 1148, 1156, 1159, 1166, 1172, 1182, 1190, 1193, 1202, 1203, 1218B, 1221A, 1221B, 1223, 1227, 1231, 1233, 1234, 1250, 1253, 1282, 1289, 1291, 1294, 1295A, 1305, 1327, 1522, 1525, 1525A, 1528B, 1536, 1537, 1540, 1813 and 9520.

Medium infection types :

(i) *Tested through grafting*

P. 77, 134, 168, 238, 254, 274, 302, 484, 571, 946, 950, 1021, 1023, 1025, 1037, 1099, 1141, 1253, 1254, 1291, 1292 and 1307.

(ii) *Tested by using mite vector*

P.7, 10, 27, 41, 51, 54, 60, 61, 62, 67, 70, 75, 76, 83, 86, 87, 97, 102, 108, 113, 122, 125, 128, 138, 149, 150, 153, 162, 165, 169, 171, 183, 186, 192, 194, 198, 207A, 209, 222, 229, 241, 246, 247, 252, 266, 292, 299, 305, 309, 314, 318, 342, 353, 361, 365, 368, 384, 402, 412, 413, 415, 448, 464, 467, 474, 492, 499, 517, 529A, 530A, 530A2, 531, 535A, 541, 544, 544A, 562A, 569, 571A, 573C, 575, 577, 578, 584, 586, 591, 592, 598, 605, 608, 613, 630, 635, 642, 650, 662, 663, 664, 671A, 680, 683, 685, 693A, 699, 702, 716, 717, 723, 726, 732, 738, 749, 773, 777, 787, 792, 796, 804, 809, 818, 821, 825, 861, 862, 876, 877, 895, 903, 906, 908, 915, 918, 932B, 959, 960, 970, 974, 977B, 986, 994, 996, 998, 1006, 1006A, 1009A, 1011, 1013, 1024, 1026, 1027, 1031B, 1072, 1074, 1080, 1091, 1096, 1099A, 1109, 1119, 1126, 1142, 1153, 1169, 1170, 1192, 1198, 1201, 1211, 1220, 1231, 1232, 1235, 1237, 1239, 1240, 1249, 1260, 1270, 1272, 1286, 1297, 1299, 1304, 1324, 1326, 1535, and 1538.

Severe infection types:(i) *Tested through grafting*

P. 306 and P. 1158.

(ii) *Tested by using mite vector*

P. 81, 93, 121, 139, 174, 188, 189, 196, 201, 202, 225B, 232, 256, 288, 307, 316, 317, 322, 334, 340, 357, 387, 388, 391, 404, 442, 476, 483, 494A, 516, 528B, 529B, 531B2, 536, 536A1, 536A2, 546, 546A, 560, 573A, 582, 593, 595, 600A, 603, 634, 637, 645, 649, 654, 672, 673, 680, 720, 727, 744, 766, 803, 831, 850,

870, 898, 925, 940, 950C, 952D, 956, 960, 962A, 962B, 971A, 973, 990, 993, 1026A, 1031A, 1059, 1071, 1121, 1137, 1151A, 1177, 1181, 1208, 1215, 1218, 1267, 1273, 1283, 1291, 1295, 1300, 1454, 1521 and 1536A.

It was observed that when the mites were introduced on four weeks or less old plants, the infection occurred readily and such plants remained in vegetative stage for a longer time resulting in complete sterility. Plants of Co. 1 variety (P. 1141) infected this way remained in vegetative stage even after 390 days while its normal cropping period is only 140 days.

ACKNOWLEDGEMENT

The authors are very much indebted to Dr. K. Ramakrishnan, Dean, University of Agricultural Sciences, Bangalore (formerly Dean, Agricultural College and Research Institute, Coimbatore) for initiating this item of research and guidance. They also wish to place on record their sincere thanks to Thiru R. Veeraswamy, Crop Specialist and Thiru R. Rathnaswamy, Research Assistant (Pulses) for kindly sparing the seed material for the studies.

REFERENCES

- CAPOOR, S. P. 1952. Observations on the sterility disease of pigeon pea. *Indian J. agric. Sci.* 22 : 271-74.
- JANARTHANAN, R., G. NAVANEETHAN, K. S. SUBRAMANIAN and G. SATHIABALAN SAMUEL. 1972. Some observations on the transmission of sterility mosaic disease of pigeon pea. *Curr. Sci.* 41 (17) : 646-7.
- KANDASWAMY, T. K. and K. RAMAKRISHNAN. 1960. An epiphytotic of pigeon pea sterility mosaic at Coimbatore. *Madras agric. J.* 47 : 440-41.
- SETH, M. L. 1962. Transmission of pigeon pea by an eriophyid mite. *Indian Phytopath.* 15 : 225-27.
- SETH, M. L. 1965. Further observations and studies on pigeon pea sterility. *Indian Phytopath.* 18 : 317-19.