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IDENTIFICATION AND UTILIZATION OF MULTIPLE DISEASE RESISTANCE IN PIGEONPEA

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Pigeonpea, chickpea, lentil, green gram and black gram constitute the major pulse crops of India. In recent years, a stagnation in the production of these pulse crops coupled with increased demand has caused concern amongst scientists, administrators, and the general public. Serious attempts are being made at all levels to improve the situation. The low yields in these crops are mainly attributed to the non-availability of cultivars with high yield potential, susceptibility to pests, and failure to adopt recommended inputs. Diseases are also an important factor contributing to the lack of stability of the yield of cultivars and there is no doubt that disease resistant cultivars should increase the stability.

Since the establishment of the All India Coordinated Pulse Improvement Project in 1965, efforts have been underway to identify sources of resistance to the major diseases and several sources of resistance have been identified. The success in case of pigeonpea in the identification and utilization of resistance sources against the three major diseases, viz., wilt, sterility mosaic, and Phytophthora blight, opens up optimistic prospects for other crops. Pigeonpea is one of the mandate crops of ICRISAT. Since 1975 systematic efforts have been made to identify sources of resistance against the major diseases. The results obtained so far are briefly summarised.

Wilt Resistance

A total of 2,302 germplasm accessions were screened following the sick plot technique (Nene *et al.* 1980) and 31 resistant lines were identified. These were ICP-1641, 3753, 3782, 4769, 5097, 6831, 7118, 7120, 7182, 7198, 7201, 7273, 7336, 7867, 8858, 8859, 8860, 8861, 8862, 8863, 8864, 8865, 8867, 8868, 8869, Purple-1 sel., Banda Palera sel., AWR-74/15 sel., Bori-1 sel., cross no. 74342, and 74363. Of these 14 were found resistant at more than one location.

Sterility Mosaic Resistance

Following the 'leaf-stapling' and 'infector row' techniques (Nene and Reddy, 1976a, 1976b) a total of 7,555 germplasm accessions were screened and 66 resistant lines were identified. These were ICP-2376, 3782, 3783, 4344, 4725, 6630, 6986, 6997, 7035, 7119, 7188, 7201, 7250, 7282, 7349, 7403, 7428, 7480, 7867, 7869, 7871, 7873, 7878, 7898, 7904, 7906, 7994, 7997, 8004, 8006, 8051, 8077, 8113, 8120, 8136, 8145, 8466, 8501, 8825, 8850, 8852, 8853, 8856, 8857, 8861, JM 2381, 2384, 2388, 2389, 2392, 2396, 2412, 2418, 2448, 2456, 2481, 2483, 2486, 2496, PI-

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394530, 394559, 394571, 395043, 395878, 396211, and 397731. In addition 433 germplasm accessions were purified through single plant selections. Fifty-four lines with consistently mild mosaic or ringspot reaction were also identified. So far 35 of these lines have been found resistant at more than one location.

Phytophthora Blight Resistance

Following a pot technique (Nene *et al.* 1980), 3,419 germplasm accessions were screened and 122 were identified as resistant. These were ICP-28, 113, 231, 339, 580, 752, 913, 934, 1088, 1090, 1120, 1123, 1149, 1150, 1151, 1258, 1321, 1529, 1535, 1586, 1788, 1950, 2153, 2376, 2505, 2673, 2682, 2719, 2736, 2974, 3008, 3259, 3367, 3741, 3753, 3840, 3861, 3867, 3868, 3891, 3899, 3937, 3945, 4135, 4141, 4168, 4699, 4752, 4765, 4866, 4882, 5450, 5656, 5860, 6865, 6952, 6953, 6956, 6974, 7057, 7065, 7151, 7182, 7185, 7200, 7232, 7269, 7273, 7414, 7533, 7624, 7657, 7701, 7754, 7795, 7798, 7810, 7837, 7910, 8087, 8101, 8103, 8104, 8110, 8117, 8122, 8124, 8127, 8131, 8132, 8139, 8141, 8144, 8147, 8149, 8151, 8214, 8236, 8248, 8258, 8282, 8287, 8289, 8328, 8332, 8466, 8557, 8558, 8559, 8560, 8562, 8564, 8568, 8579, 8603, 8610, 8619, 8675, 8688, 8692, 8700, and 8701.

Multilocation testing of these lines is in progress.

Wilt and Sterility Mosaic Resistance

By testing the sterility mosaic resistant lines for resistance to wilt and *vice versa* and by screening in the multiple disease nursery, twelve lines resistant to both sterility mosaic and wilt were identified. These were ICP-3782, 4769, 5097, 6831, 7201, 7273, 7336, 7867, 8861, 8862, 8867, and 8869. In addition, three wilt resistant lines (ICP 8858, 8859, and 8860) were found tolerant (mild mosaic or ringspot symptoms) to sterility mosaic.

Wilt and Phytophthora Blight Resistance

Three lines: ICP-3753, 7182, and 7273 were found resistant to wilt and Phytophthora blight.

Sterility Mosaic and Phytophthora Blight Resistance

Seventeen lines were resistant to sterility mosaic and Phytophthora blight. These were ICP-934, 4765, 4866, 5656, 6974, 7182, 7185, 7232, 7269, 7273, 7414, 8101, 8127, 8132, 8139, 8147, and 8151.

Wilt, Sterility Mosaic and Phytophthora Blight Resistance

One line, ICP-7273, was resistant to all the three diseases.

Breeding for Resistance

Many of the resistant lines are being used in ICRISAT breeding programme to incorporate resistance in cultivars with good agronomic background. In collaboration with the breeders, so far a total of 16,147 materials in various generations involving the parents resistant to one or

more diseases were screened and promising materials are being advanced. Few progenies/lines with good yield potential are identified.

Multilocation Testing

The lines found resistant at ICRISAT are being tested in disease endemic areas to identify the lines with broader resistance and obtain information on the variation of the pathogens.

References

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