SHORT COMMUNICATION

Evaluation of Maize Hybrids and Composites against Bacterial Stalk Rot, Brown Stripe Downy Mildew and Maydis Leaf Blight

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Maize (*Zea mays* L.) is the third important cereal crop in India after rice and wheat. Predominantly, it is grown during *kharif* season in tropical environments. The productivity in India (1.8 t/ha) is verylow as compared to the temperate areas (7.0 t/ha) and world average (3.8 t/ha). Among various factors for low yield, diseases like bacterial stalk rot (*Erwinia chrysanthemi* pv *zeae*) maydis leaf blight (*Dreschlera maydis)* and brown stripe downy mildew (*Sclerophthora rayssaie* var. *zeae*), cause significant reduction in grain yield (Sharma *et al.,* 1993). These diseases can be managed with biocides. However, resource starved farmers cannot afford to use costly chemicals. Moreover, efficacy of chemicals is usually reduced by continued rains during the cropping season. Hence, losses due to diseases can be mitigated by cultivation of resistant varieties. Keeping this in view, some Indian hybrids and composite stocks were evaluated against these diseases and information on identification of resistant sources is presented.

Two hundred and thirty nine hybrid and composite stocks of Advanced Evaluation Trails received from Directorate of Maize Research, New Delhi, were planted during *kharif* 1999 and 2000 at experimental farm of Regional Research Station, Dhaulakuan following recommended agronomic practices (Anonymous, 1993). Bacterial stalk rot epiphytotics were created by inoculating about 75-100 plants/entry with 48 hold cell suspension of *E. chrysanthemi* pv *zeae* at pre-tasseling stage using hypodermic syringe method (Singh, 1983). The field was innoculum-sick for brown stripe downy mildew, moreover, 30 days old plants were whorl inoculated with downy mildew infected leaf bits (Singh, 1983). The maydis leaf blight observations were based on natural infection. The data on incidence of *Erwinia* stalk rot was recorded as per cent wilted plants 20 days after the inoculations. The data for brown stripe downy mildew and maydis leaf blight were recorded on 1-5 and 0-5 scale, at pre-tasseling and grain formation stage, respectively (Singh, 1983). The left over seed of each entry was evaluated during the subsequent *kharif* season to confirm their reaction to the diseases.

The hybrid and composite stocks showing resistance against *Erwinia* stalk rot, brown stripe downy mildew and maydis leaf blight during the year 1999 and 2000 are given in Table 1. Three hybrids BH 1015, BH 1180 and PRO 311 were free from *Eriwinia* stalk rot and none of the stocks were free from brown stripe downy mildew and maydis leaf blight. Seventeen stocks with less than 10% stalk rot incidence were resistant and thirty-two hybrids/composites with 10-20% disease incidence were moderately resistant to *Erwinia* stalk rot.

Forty-eight entries with disease reaction >2 were resistant and 19 entries were moderately resistant (disease reaction 2-3) to brown stripe downy mildew. It was observed that stocks showing resistance to *Erwinia* stalk rot and brown stripe downy mildew were from full season maturity group. Thirty-six stocks with disease reaction 2.1-2.5 were moderately resistant to maydis leaf blight. Sources of resistance among inbreds, hybrids and composites have already been reported against *Erwinia* stalk rot (Thind and Payak, 1985; Ebron *et al.,* 1987), maydis leaf blight (Khan *et al.,* 1992; Sharma and Payak, 1990) and brown stripe downy mildew (Bains, 1989; Sharma *et al.,* 1993).

It has been observed that hybrids BH 1180, (Comp. 9010 x 9116)#, NECH 106, PHS 4783 and X 519 showed multiple resistance against all the diseases. Stocks JC 3252, PRO 311, X 521, and BH 1015, KH 5991, PRO 340, PMH 9844, Seed Tech 2331 showed

Table 1. List of maize (*Zea mays*) stocks resistant to *Erwinia* stalk rot (*Erwinia chrysanthemi* pv *zeae*) brown stripe downy mildew (*Sclerophthora rayssiae* var *zeae*) and maydis leaf blight (*Dreschlera maydis*)

Erwinia stalk rot

FREE: BH 1015, BH 1180 and PRO 311

RESISTANT (1->10%): (Comp. 9010 x 9116)#, FH 3138, JC 3252, KH 5991, NECH 106, PMH 9844, PHS 4783, PRO 311, PRO 340, Seed Tech 2331, X 519, X 519A, X521

MODERATELY RESISTANT (10-20%): AH 418, AH 422, AH 918, AMZ H 98, BH 1102, BH 1179, BIO 9637, Comp 9110, EH 30425, F 7012, HKH 1159, HKH 1121, Him 129, JK 3251, JKO 682, Kiran, KH 510, NECH 01, NECH 02, NMH 9804, Navjot, PAC 79004, PHS 4757, PHS 4786, PMH 9803, PRO 342, Seed Tech 12, SSFX 411, SSFX 9199, X 1288B, X 1288 D.

Brown stripe downy mildew

RESISTANT: (1-2): AMZ H 98, AH 118, AH 421, AH 422, BH 1015, BH 1025, BH 1178, BH 1179, BH 1180, BH 1181, BH 1183, BIO 9637, EH 30425, F 7001, F 7013, HKH 1100, HKH 1121, HKH 1123, HKH 1140, HKH 1159, JH 2906, JH 3125, JH 3795, JK 0581, KJ 0682, JK 1181, KH 409, KH 5991, Kiran, NECH 02, NECH 105, NECH 106, NMH 9804, Navjot, PAC 79002, PAC 79003, PMH 9803, PMH 9844, PHS 4754, PHS 4783, PMZ 1251, PMZ 127, PRO 340, PRO 342, Seed Tech 2331, SSFX 411, SSFX 9199, Seed Tech 12, X 519, X 1174(w), X 1288B.

MODERATELY RESISTANT (2->2.5): Comp 9110, (Comp 9010 x 9116)#, EH 30422, F 7012, HKH 1138, Him 129, JC 3251, KH 510, MECH 01, PRO 311, PRO 339, PHS 4759, PAC 79001, SSFX 522, Surya, Seed Tech 1250.

Maydis leaf blight

RESISTANT: (1-2): AH 914, AH 918, BH 1180, BH 1183, BIO 9637, Comp 9010 x 9116#, Comp 9110, EH 30425, F 7001, Ganga 11, HKH 1138, JC 3251, JC 3252, JH 2906, JH 3125, JK 1181, JK 06802, KH 510, Kiran, NECH 02, NECH 03, NECH 106, PAC 79001, PAC 79002, PAC 79003, PHS 4783, PHS 4757, PHS 4759, PHS 4786, PMZ 127, PRO 311, SSF X 522, Seed Tech 1250, X 519, X521, X 1138R, X 1288B, X 1288D.

MODERATELY RESISTANT (2.1->3.0): AH 418, BH 1181, EH 30422, F 7012, F 7013, GK 3003, HKH 1100, HKH 1121, HKH 1140, HKH 1159, JH 3795, KJ 0581, KH 409, KH 5991, NECH 105, NMH 9804, Navjot, PAC 79004, PMH 9803, PMH 9844, PMZ 1251, PRO 339, PRO 340, Seed Tech 12, Seed Tech 2350, X 519A.

combined resistance against *Erwinia* stalk rot and maydis leaf blight and *Erwinia* stalk rot and brown stripe downy mildew, respectively. Stocks BIO 9637, EH 30425, F 7001, JK 0682, JH 2906, JK 1181, Kiran, NECH 02, PAC 79003, PMZ 127, PHS 4757, PAC 79002, Seed Tech 12 and X 1288B were resistant to maydis leaf blight and brown stripe downy mildew. As has been recorded in the present studies multiple resistance has been reported against maydis leaf blight and brown stripe downy mildew (Dey *et al.,* 1983), *Turcicum* leaf blight, maydis leaf blight and brown spot (Kaiser and Pradhan, 1990) and *Erwinia* stalk rot, maydis leaf blight and brown stripe downy mildew (Basandrai *et al.,* 2000).

Interestingly, Navjot, PRO 311, HIM 129, BH 9637, Kiran, KH 510, Surya and Ganga 11 are identified varieties, which may be directly recommended in disease-prone areas. Most of the hybrids are from private sector. Availability of parental inbred lines of resistant stocks may help to work out genetics of resistance against these diseases, for their better utilization to develop resistant varieties.

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