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RESEARCH ARTICLE

Field screening of linseed genotypes for resistance to *Alternaria* blight in the north central plateau zone of Odisha.

Janakinath Dash[1],[*] Bhima Sen Naik[2] and Uma Ballav Mohapatra[3].

1. Nayagarh Autonomous College, Nayagarh-752 069, Odisha, India.
2. Orissa University of Agriculture and Technology- Chiplima Campus, Regional Research and Technology Transfer Station, Chiplima, Sambalpur-768 025, Odisha, India.
3. Government of Odisha - Science and Technology Department, Bhubaneswar-751 001, Odisha, India.

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Corresponding Author

Bhima Sen Naik.

Abstract

Two hundred ninety one genotypes of linseed including 60 local land races of Odisha and 231 cross-derivatives and selections from different sources within and outside Odisha were screened for resistance to *Alternaria* blight. No entry was disease free, one entry 'OL 3-1'was resistant, two entries 'OL 2-7' and 'OL 4-1' were moderately resistant, and the rest were moderately susceptible, susceptible or highly susceptible.

Introduction

Linseed (*Linum usitatissimum* L.) is the second most important winter oilseed crop and stands next to rapeseed-mustard in area and production in India. It has an important position in Indian economy due to its wide industrial utility. But, the national average productivity of linseed is quite low. As per FAOSTAT (2014), India ranks 4th among world's linseed producing countries. However, in terms of productivity, India (392 kg/ha) is far below than Switzerland (2647 kg/ha), Tunisia (2633 kg/ha), U.K. (2600 kg/ha), France (2121 kg/ha) and New Zealand (1853 kg/ha). In India, during 2013-14 linseed is grown in an area of 292.1 thousand hectares with annual production of 141.2 thousand tonnes and productivity of 484 kg/ha. Out of 15 linseed growing states, the major are Madhya Pradesh (110.4 thousand ha), Maharashtra (31.0 thousand ha), Chhattisgarh (26.2 thousand ha), Uttar Pradesh (26.0 thousand ha), Jharkhand (25.5 thousand ha), Odisha (22.9 thousand ha) and Bihar (18.7 thousand ha). In Odisha, the annual production is 11 thousand tonnes with productivity of 478 kg/ha (Anonymous, 2015a, b). The North Central Plateau Zone of Odisha comprising the districts of Mayurbhanj and Keonjhar contributes to about 50.6 % of the total linseed area of the state of Odisha (Anonymous, 2015b). However, a significant number of farmers are forced to sow linseed one month late due to excess moisture in the field. Seed setting is highly affected due to higher temperature during later phase of growth decreasing seed yield significantly (Dash *et al*., 2011). Further, the crop is prone to the disease blight caused by *Alternaria lini* Dey. So, we need a high yielding linseed variety for late sown conditions with resistance to blight. With this objective, field screening of linseed genotypes for resistance to *Alternaria* blight was initiated.

Material and Methods

Two hundred ninety one genotypes of linseed including 60 local land races of Odisha and 231 cross-derivatives and selections from different sources within and outside Odisha were sown one month late during November, i.e., on 22.11.2006 and 22.11.2007. The local land races were purified during previous two years. The field screening trial was laid out in observation strip at the Regional Research and Technology Transfer Sub-station of OUAT at Jashipur, Mayurbhanj, Odisha (latitude : 21^{o} 57' N, longitude : 86^{o} 06' E, altitude : 400 m above mean sea level,

annual rainfall : 1475 mm, soil : red lateritic, sandy loam and acidic). Each genotype was sown in a single row of 3 m length with a spacing of 30 cm × 5 cm between and within the row respectively. The sowing depth was 2-3 cm. Recommended package of practices was followed to raise a good crop. All entries were assessed visually based on percentage of leaf area affected using 0-5 scale (Anonymous, 1991) as detailed below:

0=Free (F)
1=0.1 to 10% leaf area affected (R)
2=10.1 to 25 % leaf area affected (MR)
3=25.1 to 50 % leaf area affected (MS)
4=50.1 to 75 % leaf area affected (S)
5=75.1 to 100 % leaf area affected (HS)

Result and Discussion

The disease reactions presented (Table 1) are based on two-year observations (the reaction is not the average). The results revealed that no entry was disease free, one entry OL 3-1 was resistant, two entries OL 2-7 and OL 4-1were moderately resistant, and the rest were moderately susceptible, susceptible or highly susceptible.

The results are based on screening under natural field conditions. So, OL 3-1, OL 2-7 and OL 4-1 need to be evaluated under artificial conditions to confirm the resistance before using them in breeding programme.

Table1. Disease reaction of 291 linseed genotypes to *Alternaria* blight over two years

Scale (0-5)	Category	Genotypes
0	F	NIL
1	R	OL 3-1
2	MR	OL 2-7, OL 4-1
3	MS	OL 93414-3, CI 1956, IC 16392, BAU 189-2, OL 98-10-3, OL 93418-2, OL 98-12-1, OL 98-2-5, OL 98-1-4, RL 87, RLC 8, LC 54, OL 98-8-8, MLH 12, LMH 16-5, RLC 3, RLC 41, NML 4, LCK 10-10, NL 129, LC 1049, OL 98-8-3, OL 98-18-3, OL 93418-1, LW 36-3, PCA 18, PCA 8, LCK 9814, LCK 119, OL 98-16-7, LCK 9733, SLS 27, JRF 5, LIN 12, OL 98-5-3, LCK 233-1, RLC 42, LCK 9436, NL 142, OL 98-2-4, LMH 78, OL 1-3, LMH 43, NL 97, EC 1392, PCA 9, RLC 2, PCA 12
4	S	LMS 11-98, PKDL 10, OL 98-3-3, SPS 17-48-544, OLC 35, 133,OL 98-16-1, OLC 54, OL 98-9-4, OLC 38, OL 98-12-2, OL 98-15-3, OLC 23, OLC 4, LIN 14, OL 98-16-4, OL 98-10-1, OL 98-1-1, OL 98-15-6, OLC 3, OL 98-16-3, OL 98-11-2, OL 2-3, OLC 32, OLC 27, OLC 51, OLC 53, JLP 11, OLC 48, OLC 7, NL 105, PCA 11, OLC 14, OL 98-17-5, OL 98-16-2, OL 3-11, OL 98-16-5, OLC 33, OL 98-16-6, OLC 9, OL 98-10-6, OL 98-2-6, OL 98-6-1, OL 98-18-1, 442, OLC 59, OL 98-4-4, RLC 33, OL 9342-1, PCA 13, R 7, OL 9394-2, T 393, LC 18, OL 18-4, OLC 36, OLC 44, LMS 5-38, OL 98-12-3 , LCK 37, PCA 2, Kiran, Neelum, OL 98-17-4, PCA 16, Niali, OL 98-11-5, EC 41562, OL 19-11,5610, Acc No. 442,1052/RLC-27, RL 771, OLC 61, OL 93418-2-2, OL 98-11-4, LCK 14, LMH 42, OL 98-8-1, LC 1038, OL 98-18-4, LHCK 10, RL 17, OL 98-7-5,1216/JRF-5, OL 2-4, OL 98-2-2, LCK 206, OL 98-3-1, BAUL 4-4, RLC 1, P 650, OLC 22, JLT 32, Mayurbhanj Local, Acc No. 1396, OL 98-2-3, OL 98-9-4, BAULK 2, OL 98-1-2, GS 234, OL 98-1-4, JRF 3, NL 9, RLC 29, RLC 6, OLC 58, LIN 2, LCK 3707, LC 1009, PLP 1, LW 36-3, RLC 27, OL 92-16-3, LHCK 82, RLA 71, RRL 1, LCK 216, SPS 72-23-10, LCK 241, CI 1466, PCA 89, OL 2-5, OL 98-18-5, EC 41563, BAULK 1, NDL 8804, JRF 4, OL 98-11-2, PCA 7, LMC 926, LCK 8523, LCK 8901, BAU 4708, LHCK 176, OL 98-17-6, OL 98-3-2, RLC 44, OL 7-7, OL 3-2, LCK 8132, Chiplima 6, LMC 1020, PKDL 8, OL 98-17-6, Chiplima 3, SLS 26, 1396, LCK 9816, OL 98-7-2, LMH 16-5, OLC 37, OL 98-5-1, LCK 875, LMH 90-7, OL 98-5-6, LIN 99289, KL 49-47, A 95-13, LS 2323, BAULK 8, Padmini, OLC 11, RL 1011
5	HS	OLC 20, OLC 40, OL 98-16-2, ES 1531, OLC 17, OLC 10, OLC 49, OLC 2, LMS 3-19, LHCK 88062, OLC 34, OLC 46, OLC 26, OL 98-15-4, OLC 15, OLC 39, OL 98-4-5, OL 98-4-1, OL 98-8-5, OLC 12, JLT 27, OL 98-10-4, OLC 25 , OL 98-15-1, OL 98-16-9, OL 92-4-3, RLC 71, OLC 56, OLC 1, OL 98-16-8, OLC 16,OLC 42, OL 98-8-2, OLC 55, OLC 6, ,OLC 57, OL 22-1, OLC 41, OLC 31, LMH 91-24, LMH 77, OLC 50, OLC 13, OLC 28, ML 48, OLC 21, OL 98-8-4, OLC 5, OLC 19, OLC 60, OL 98-4-2, LA 2, TBNL 18, OL 98-5-2, OLC 45, OLC 47, OLC 8, OLC 18, OL 98-8-6, OLC 29, LC 1030, T 397

NB**:** F = Free; R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; HS = Highly Susceptible

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