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RESEARCH ARTICLE

Field screening of linseed genotypes for resistance to powdery mildew (*Oidium lini* Skoric) in the north central plateau zone of Odisha.

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Abstract

Two hundred ninety four genotypes of linseed including 61 local land races of Odisha and 233 cross-derivatives and selections from different sources within and outside Odisha were screened for resistance to powdery mildew. Only one entry 'OLC 47' was moderately susceptible, and the rest were either resistant or moderately resistant.

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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 powdery mildew caused by *Oidium lini* Skoric due to late sowing. So, we need a high yielding linseed variety for late sown conditions with resistance to powdery mildew. With this objective, field screening of linseed genotypes for resistance to powdery mildew was initiated.

Material and Methods

Two hundred ninety four genotypes of linseed including 61 local land races of Odisha and 233 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° 57' N, longitude : 86° 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 4 m length with a spacing of 25 cm × 5 cm between and within the row respectively. The sowing depth was 2-3cm. 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 only one entry OLC 47 was moderately susceptible, and the rest were either resistant or moderately resistant.

The results are based on screening under natural field conditions. So, the resistant genotypes need to be evaluated under artificial conditions to confirm the resistance before using them in breeding programme.

Table 1: Disease reaction of 294 linseed genotypes to powdery mildew over two years

Scale (0-5)	Category	Genotypes
0	F	NIL
1	R	OLC 2, 6, 7, 13, 55 and 57; LMH 90-7, OL 3-1, OL 98-16-7, BAU 189-2, Acc No 1396, LCK 9733, OL 98-16-5, LS 2323, LMH 43, OL 3-11, OL 98-15-3, LC 54, A 95-13, JRF 4, OL 3-2, MLH 12, OL 93418-2, OL 98-3-1, OL 98-16-9, OL 22-1, CI 1466, LCK 3707, OL 98-17-5, Kiran, NL 142, Chiplima 3, P 650, PKDL 8, RRL 1, OL 98-2-4, RL 1011, OL 98-12-4, EC 41563, LHCK 82, OL 98-3-3, EC 41562, OL 98-11-2, OL 98-1-2, OL 98-15-6, SPT 5, RLC 28, PKDL 10, OL 98-12-1, OL 98-16-3, OL 98-10-4, OL 2-7, LMH 16-5, POLF 19, OL 7-7, OL 98-10-3, OL 98-18-1, LMH 78, T 393, OL 98-15-4, NL 9, OL 98-6-1, OL 98-15-1, SPS 72-23-10, OL 98-1-1, JLT 27, LIN 14, 1216/JRF 5, OL 98-5-2, OL 98-16-2, OL 98-8-5, OL 98-18-4, LCK 9436, OL 4-1, PCA 89, 1052/RLC 27, OL 10-2, RLC 2, LMS 11-98, OL 98-10-5, OL 98-16-8, Neelum, NL 129, OL 98-1-3, OL 98-3-2, LCM 1020, LCK 875, OL 98-8-2, Chiplima 6, LCK 216, OL 98-5-6, OL 98-16-1, OL 4-1, OL 98-4-1, OL 98-12-3, LCK 9814, OL 98-10-6, JRF 3, OL 98-11-1, OL 93418-1, SLS 27, NL 97, OL 98-16-6, LCK 9816, EC 1465, OL 98-2-2, OL 1-3, SLS 26, OL 9817-4, GS 234, OL 98-8-4, LMS 5-38, OL 2-4, LCK 9627, OL 93418-2-2, ML 48, OL 2-3, IC 16392, RL 87, OL 98-18-5, LW 36-3, OL 92-16-3, OL 98-16-4, OL 19-11, OL 98-4-2, EC 1392, OL 98-17-6, OL 98-8-6, OL 98-2-3, RLC 33, RLC 29, PCA18, RLC 71, RLA 71, OL 98-8-3, LIN 12, PCA 13, OL 98-1-4, OL 98-5-1, LC 1009, LMS 3-19, OL 98-7-5, OL 98-2-1, OL 98-17-6, LHCK 176
2	MR	OLC 1, 3, 4, 5, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 48, 49, 50, 51, 52, 53, 54, 56, 58, 59, 60 and 61; LA 2, PCA 7, OL 98-8-8, PCA 8, PCA 12, LCK 8523, OL 98-4-5, JRF 5, LCK 233-1, OL 98-4-4, LMC 926, LCK 153, RLC 1, LMH 91-24, OL 98-7-2, PCA 2, OL 98-11-4, OL 9342-1, OL 9349-2, RLU 44, OL 92-4-3, LM 898, R 17, NML 4, LCK 213, OL 98-9-4, RLC 3, LCK 88062, BAULK 4-4, 5610, OL 98-5-3, OL 18-4, LC 1049, LC 1038, Neela, Acc No 442, 133, JLT 32, BAULK 8, 442, NDL 8804, OL 98-8-1, LMH 16-5, OL 98-1-4, RL 771, 1396, LCK 8901, Padmini, Niali, OL 98-18-3, LCK 241, TBNL 18, OL 98-2-6, LHCK 10, LCK 8132, OL 93414-3, RLC 41, RLC 27, LIN 99289, LCK 14, CI 1956, OL 98-11-5, ES 1531, PCA 9, LHCK 144, SPS 17-48-544, LCK 119, LCK 37, NL 105, OL 98-16-2, BAULK 1, T 397, KL 49-47, PCA 16, OL 2-5, LCK 10-10, LMH 77, BAULK 2, RLC 42, Mayurbhanj Local, LC 1030, R 7, OL 98-2-5, PCA 11, LMH 42, LC 18, OL 98-10-1, BAU 4708, OL 98-12-2, PLP 1, JLP 11, LCK 206, LIN 2, RLC 6
3	MS	OLC 47
4	S	NIL
5	HS	NIL

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

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