Pathogenic variability of *Sclerotinia sclerotiorum* isolates on *Brassica* differentials

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<table>
<thead>
<tr>
<th>English name</th>
<th>Botanical name</th>
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<tbody>
<tr>
<td>Indian mustard/ Brown mustard</td>
<td><em>Brassica juncea</em> (L.) Czern. &amp; Coss.</td>
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<td>Indian rape/Rapeseed Toria</td>
<td><em>Brassica rapa</em> L. ssp. toria (syn. <em>B. campestris</em> L. ssp. toria)</td>
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<td>Ethiopian mustard</td>
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<td>Rapeseed/ Rutabaga</td>
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<td>Taramira/rocket salad</td>
<td><em>Eruca sativa</em></td>
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Major Insect and Diseases of Rapeseed-Mustard

- Sclerotinia rot
- Alternaria blight
- Painted bug
- Aphid
- White rust
Pathogenic variability of *Sclerotinia sclerotiorum* isolates on *Brassica* differentials
**Sclerotinia sclerotiorum**

*Sclerotinia sclerotiorum* (Lib.) de Bary is a ubiquitous necrotrophic fungal pathogen.

It is capable of infecting about 500 plant species among 75 families (Sharma et al 2015).

In India, it has become a serious problem in many parts of the country like Punjab, Haryana, Rajasthan and Bihar.

*Sclerotinia* has the potential to cause up to 39.4% reduction in yield.

This disease gained importance particularly in areas where farmers practiced mono-cropping of Indian mustard, which led to complete crop failure with more than 80 per cent disease incidence recorded in some parts of Punjab Haryana and Rajasthan.
Symptoms of Sclerotinia rot on stem, leaf and pod

Sclerotia formed on stem, in pith & on root
Variability
25 different Indian geographical isolates of *Sclerotinia sclerotiorum* were studied for their morphological and cultural variability.

On the basis of morphological data, isolates were grouped into two major clusters I and II. Cluster II was further divided in four groups A, B, C and D.
Mycelial Compatibility Group (MCG)

Mycelial compatibility is the ability of two strains of filamentous fungi to anastomosis and form one continuous colony.
Total 25 bands were observed having relative mobility (Rm) value ranging from 0.14 to 0.72.

The similarity indices for different isolates ranged from 0.32 to 1.0 indicating high variability among the different geographical isolates.
45 Primers produced 692 scorable amplicons. Out of these, 385 fractionated fragments were reported polymorphic.

All isolates were placed into four groups and these major clusters were further divided into sub cluster.
Objectives

Resistance in oilseed *Brassica* against the disease is lacking, only partial tolerance to *S. sclerotiorum* has been reported (Sharma et al. 2012).

Keeping in view, the different *Brassica* differentials were challenged against 25 geographical isolates of *S. sclerotiorum* to confirm the variation among pathogen population and genetic difference in host species.
Twenty five geographical isolates of S. sclerotiorum causing SR of Brassica were collected during 2009-12 from 25 locations in 9 states of India and was maintained in vitro.

An experiment was conducted to study the pathogenic variability during 2012-13 at ICAR- Directorate of Rapeseed-Mustard Research, Bharatpur, India.
Nine Brassica differentials i.e.
1. B. juncea (cv. Rohini)
2. B. carinata (cv. Kiran)
3. B. rapa var toria (cv. PT 303),
4. B. rapa var yellow sarson (cv. NRCYS 5-2),
5. B. rapa var Brown sarson (cv. KOS 1),
6. B. nigra (cv. BN-1),
7. B. napus (cv. GSC6),
8. Eruca sativa (cv. T-27) and
9. B. alba were used during the study.

These were sown in two replications and 65-70 days after sowing, plants were inoculated with stem inoculation technique.
3-weeks after inoculation the observations on stem lesion length and per cent disease incidence were recorded.
<table>
<thead>
<tr>
<th>Isolate</th>
<th>B. juncea (Rohini)</th>
<th>B. carinata (Kiran)</th>
<th>B. rapa var. toria (PT 303)</th>
<th>B. rapa var y.s. (NRCYS 5-2)</th>
<th>B. nigra (BN-1)</th>
<th>B. napus (GSC6)</th>
<th>Eruca sativa (T-27)</th>
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</table>
% Sclerotinia infection on different Brassica
Lesion size on different Brassica
Pathogenicity of *Sclerotinia* isolates on different Brassica spp.

![Graph showing pathogenicity of Sclerotinia isolates on different Brassica spp.](image_url)

Legend:
- **B. juncea** (Rohini)
- **B. carinata** (Kiran)
- **B. rapa** var. *toria* (PT 303)
- **B. rapa** var. *s.* (NRCYS 5-2)
- **B. nigra** (BN-1)
- **B. napus** (GSC6)
- *Eruca sativa* (T-27)
- **B. rapa** var. *b.s.* (KOS 1)
- **B. alba**

*Isolate* axis:
- SR 1
- SR 2
- SR 3
- SR 4
- SR 5
- SR 6
- SR 7
- SR 8
- SR 9
- SR 10
- SR 11
- SR 12
- SR 13
- SR 14
- SR 15
- SR 16
- SR 17
- SR 18
- SR 19
- SR 20
- SR 21
- SR 22
- SR 23
- SR 24
- SR 25

*Lesion size* (cm.):
- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45
Variability in different Sclerotinia geographical isolates

Minimum dissimilarity = 17.35108 (between SR4 and SR16)

Max Dissimilarity = 66.66762 (SR-10 and others)
Factorial analysis of geographical isolates
All the 25 different geographical isolates showed significant variation in stem lesion length (cm) and per cent disease incidence.

Based on pathogenic variability the isolates can be grouped as:

- highly virulent (SR-06 and SR-10),
- virulent (SR-01, SR-02, SR-04, SR-08, SR-12, SR-15 and SR-25),
- moderately virulent (SR-03, SR-07, SR-09, SR-11, SR-17, SR-20, SR-21 and SR-24) and
Highly susceptible Brassica differential were all var of B. rapa and E. sativa while highly tolerant was B. alba (lesion size 0.5-1.9 cm).
Morphological variability and genetic diversity of different geographical isolates of *S. sclerotiorum* were already proved.

The present study demonstrated existence of pathogenic variability among the geographical isolates which could be helpful to design resistance breeding for *S. sclerotiorum* in oilseed *Brassica*. 
My sincere Thanks to:

• Indian Council of Agricultural Research (ICAR), New Delhi

• Department of Science and Technology (DST), Govt. of India

• Organizers 14th International Rapeseed Congress

• Director, ICAR-Directorate of Rapeseed-Mustard Research, Bharatpur

• All scientists and technical staff of DRMR
VOUS REMERCI BEAUCOUP

THANK YOU...