



ISSN NO. 2320-5407

Journal homepage: <http://www.journalijar.com>
Journal DOI: [10.21474/IJAR01](https://doi.org/10.21474/IJAR01)

INTERNATIONAL JOURNAL
OF ADVANCED RESEARCH

RESEARCH ARTICLE

Survey of diseases of linseed (*Linum usitatissimum* L.) in Mayurbhanj district of Odisha.*Bhima Sen Naik¹ and Kishore Chandra Sahoo².

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Manuscript Info**Manuscript History:**

Received: 18 February 2016
Final Accepted: 19 March 2016
Published Online: April 2016

Key words:

Alternaria blight, linseed, powdery mildew, resistance, rust, survey, wilt.

Abstract

Linseed disease survey was conducted in the district of Mayurbhanj in Odisha from 2000-2001 to 2008-2009 for nine years. The incidence of wilt, *Alternaria* blight, powdery mildew and rust was nil to 7.6 %, nil to 80.0 %, nil to 20.0 % and nil to 32.7 %, respectively over the years. Plant pathological research programme and resistance breeding should be resorted to combat *Alternaria* blight disease so that productivity of linseed remains stabilized.

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Introduction

Linseed or oil flax (*Linum usitatissimum* L., 2n= 30, X = 15) belongs to the order Malpighiales, the family Linaceae, and the tribe Lineae. It is popularly known as *atasi*, *pesi*, *phesi* or *tisi* in Odia. It is the second most important *rabi* (winter) oilseed crop and stands next to rapeseed-mustard in area and production in India. Although linseed plants have several utilities, it is commercially cultivated for its seed, which is processed into oil and after extraction of oil, a high protein livestock feed is left. Linseed oil content varies from 33-45% and has been used for centuries as a drying oil. About 20% of the total linseed oil produced in India is used by the farmers and the rest about 80% goes to industries for the manufacture of paints, varnish, oilcloth, linoleum, printing ink etc.

Linseed 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 lower 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 district of Mayurbhanj contributes 35.5 % 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 diseases viz. blight (caused by *Alternaria lini* Dey) and

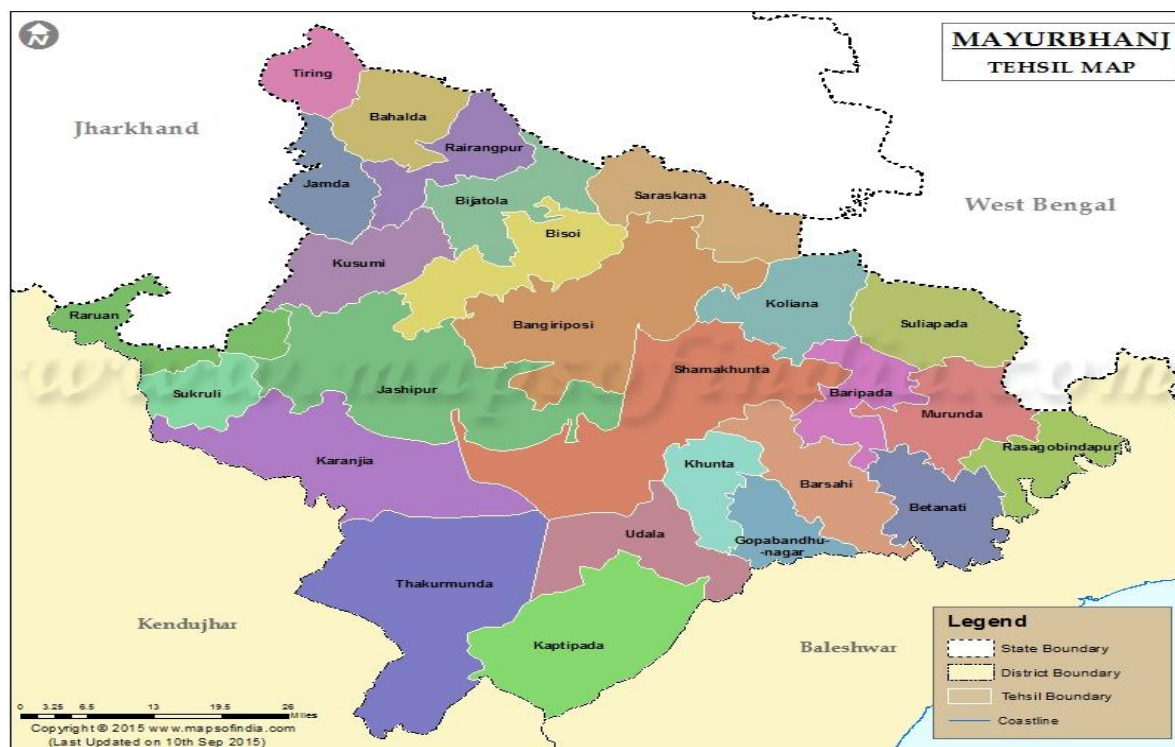
powdery mildew (caused by *Oidium lini* Skoric) due to late sowing. Again, when linseed is consecutively grown in a field, wilt (caused by *Fusarium oxysporum* f.sp. *lini* (Bolley) Snyder and Hansen) emerges as a malady in this area. To prioritize diseases in research programmes of plant pathology and plant breeding we need information on prevalence of linseed diseases in the area. So, we carried out survey of diseases of linseed in farmers' field in the district of Mayurbhanj in the state of Odisha in India.

Material and Methods

Linseed is predominantly grown in the *tehsils* of Jashipur, Karanjia, Sukruli, Raruan, Kusumi, Bisoi, Bijatola, Rairangpur, Jamda, Bahalda and Tiring in the district of Mayurbhanj (latitude: 21° 16' - 22° 34' N; longitude: 85° 40' - 87° 11' E) (Fig. 1). For survey of diseases randomly *tehsils* were selected and a few villages in each *tehsil* were surveyed. Disease reaction was observed in five farmer's fields in each village, and five observations were recorded at five different places in each field randomly. The fields were assessed visually for *Alternaria* blight, powdery mildew and rust based on percentage of leaf area affected. In case of wilt, the fields were assessed visually based on percentage of infected plants. Mean disease incidence (%) for wilt, *Alternaria* blight, powdery mildew and rust was estimated for each village and then its range in a *tehsil* was worked out. The probable date of sowing was estimated by visually observing the stage of the crop in the farmer's field.

Result and Discussion

The disease survey was carried out in the *tehsils* of Jashipur, Karanjia, Sukruli, Raruan, Kusumi and Bisoi during 2000-2001 to 2008-2009 for nine years (Fig. 1) and the result is presented in Table 1. Linseed is cultivated by the farmers as a rainfed or *utera* crop in the district, and the optimum time of sowing is first fortnight of October. During survey it was found that mostly farmers grew linseed about one month late and used local land races. The incidence of wilt was from nil to 7.6 %, and those of *Alternaria* blight, powdery mildew and rust were from nil to 80.0 %, from nil to 20.0 % and from nil to 32.7 %, respectively. However, the occurrence of powdery mildew and rust was feeble over the years and most of the years the crop was free. In case of wilt, up to 10 % infection is considered moderately resistant. So, wilt is not of concern. The less infection of wilt may be ascribed to either crop rotation followed by the farmers or resistance of the local land races used. The only disease *Alternaria* blight warrants attention.



Courtesy: www.mapsofindia.com

Figure 1: Jashipur, Karanjia, Sukruli, Raruan, Kusumi and Bisoi *tehsils* of Mayurbhanj district under linseed disease survey.

Table 1: Prevalence of diseases of linseed in the district of Mayurbhanj from 2000-2001 to 2008-2009.

Winter Season (October-March)	Tehsil	No of villages surveyed	Time of survey	Probable date of sowing	Range of mean disease incidence in different villages within a tehsil (%)			
					Wilt	Alternaria blight	Powdery mildew	Rust
2000-2001	Jashipur	02	3 rd week Feb 2001	3 rd week Nov 2000	1.8-7.0	10.0-16.0	NIL	NIL
	Raruan	03	3 rd week Feb 2001	1 st week Nov 2000-3 rd week Nov2000	2.9-6.0	10.0-12.0	NIL	0.0-5.0
	Bisoi	02	3 rd week Feb 2001	1 st week Nov 2000-2 nd week Nov2000	2.0-3.0	14.0-17.0	NIL	NIL
	Karanjia	01	1 st week Mar 2001	3 rd week Nov 2000	NIL	25.0	NIL	NIL
2001-2002	Jashipur	03	3 rd week Feb 2002	1 st week Dec 2001	1.0-6.2	15.0-17.5	0.0-12.5	NIL
2002-2003	Jashipur	02	4 th week Feb2003	4 th week Nov 2002-1 st week Dec 2002	1.7-3.0	0.0-2.3	NIL	1.0-3.7
	Raruan	03	4 th week Feb2003	4 th week Nov 2002-1 st week Dec 2002	0.5-2.0	0.0-10.0	0.0-1.0	0.0-10.0
2003-2004	Raruan	02	3 rd week Jan 2004	1 st week Nov 2003-1 st week Dec 2003	0.0-0.2	0.0-1.0	NIL	NIL
	Bisoi	05	3 rd week Jan 2004	1 st week Nov 2003-1 st week Dec 2003	0.0-0.5	0.0-8.0	NIL	NIL
2004-2005	Jashipur	05	4 th week Jan 2005-1 st week Feb 2005	1 st week Nov 2004-1 st week Dec 2004	0.0-7.6	0.5-6.8	NIL	0.0-2.4
	Rauran	02	4 th week Jan 2005	1 st week Dec 2004	1.0-3.0	2.0-2.3	NIL	NIL
	Karanjia	04	4 th week Jan 2005	4 th week Oct 2004-4 th week Nov 2004	0.0-1.0	1.0-6.0	NIL	0.0-2.0
	Sukruli	02	4 th week Jan 2005	4 th week Oct 2004-2 nd week Nov 2004	NIL	5.0-7.0	NIL	0.5-1.3
	Bisoi	08	1 st week Feb 2005	1 st week Nov2004-2 nd week Nov 2004	0.0-4.3	3.5-45.0	NIL	0.0-32.7
	Kusumi	04	2 nd week Feb 2005	2 nd week Nov2004-1 st week Dec 2004	NIL	0.0-36.6	NIL	1.5-10.5
2005-2006	Jashipur	05	2 nd week Feb 2006	2 nd week Nov2005-1 st week Jan 2005	0.0-1.6	0.0-6.0	NIL	0.5-0.8
	Rauran	03	2 nd week Feb 2006	2 nd week Nov2005-4 th week Nov 2005	0.0-0.5	0.2-2.0	NIL	0.2-0.8
	Kusumi	03	2 nd week Feb 2006	4 th week Nov2005	0.5-6.0	0.0-1.5	NIL	0.0-0.5
	Bisoi	06	3 rd week Feb 2006	2 nd week Nov2005-1 st week Jan2006	0.0-5.0	0.0-65.0	NIL	0.0-0.5
	Karanjia	03	3 rd week Feb 2006	2 nd week Nov 2005-2 nd week Dec 2005	0.0-0.5	1.0-7.5	NIL	0.0-2.5
	Sukruli	01	3 rd week Feb 2006	4 th week Nov2005	NIL	5.0	NIL	7.5
2006-2007	Jashipur	03	1 st week Feb 2007	2 nd week Nov2006-4 th week Nov2006	0.0-0.7	1.0-57.5	0.0-4.5	NIL
	Raruan	04	1 st week Feb 2007	1 st week Nov2006-4 th week Nov 2006	NIL	0.0-8.0	0.0-3.3	NIL
2007-2008	Jashipur	03	3 rd week Feb2008-1 st weekMar2008	4 th week Nov2007-4 th week Dec 2007	0.0-1.0	0.8-55.0	NIL	0.0-1.5
	Raruan	03	3 rd week Feb 2008	2 nd week Nov2007-4 th week Nov2007	NIL	0.0-4.5	NIL	NIL
	Bisoi	03	2 nd week Mar 2008	4 th week Dec2007	NIL	40.0-46.7	1.0-2.3	0.0-0.7
2008-2009	Jashipur	0.3	4 th week Feb 2009	4 th week Nov 2008-1 st week Dec 2008	NIL	5.0-50.0	1.0-20.0	0.0-2.0
	Bisoi	03	3 rd week Feb 2009	1 st week Nov 2008	0.0-5.0	20.0-80.0	0.5-2.0	0.0-0.5

Conclusion

Plant pathological research programme and resistance breeding should be resorted to combat *Alternaria* blight disease so that productivity of linseed remains stabilized.

Acknowledgement

The authors thank Mr. Bishnu Prasad Jena and Mr. Mahendra Mallick for their help in survey of diseases and www.mapsofindia.com for *tehsil* map of Mayurbhanj

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