

Bean Anthracnose

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Anthracnose is a seed-transmitted disease caused by the fungus *Colletotrichum lindemuthianum*. Although once a severe problem for Michigan bean growers, development of resistant varieties, improved seed production and certification programs have essentially eliminated the threat of anthracnose. However, the disease is still found in a few fields every year and occasionally causes severe yield losses (Fig. 1). Black beans are especially susceptible and in 1981 the use of contaminated seed caused severe disease problems.

There are numerous strains or races of the bean anthracnose fungus which are distinguished by their ability to attack certain bean varieties. The alpha, beta and gamma strains are found in Michigan. One additional strain known as delta has not been found in Michigan, but was reported in Ontario, Canada; the delta strain attacks most commercial dry bean varieties grown in Michigan.

Symptoms

Disease symptoms produced by all strains are identical. It is only through the inoculation of selected bean cultivars that the different strains can be identified. The initial symptom of anthracnose infection is a dark brown to black lesion along the leaf veins on the underside of the leaves. Leaf petioles and even stems may also show this symptom (Fig. 2). Since infections are initially restricted to the lower leaf surface, plants may appear quite normal until the disease is well advanced. Therefore, growers must take the time to thoroughly examine plants which have any unusual appearance.

Symptoms of pod infection by *C. lindemuthianum* are very distinct and appear as circular, reddish-brown to near black lesions on the pods (Fig. 3). The spots develop a sunken center as the lesions enlarge. The center first shows brown, dead tissues which are quickly replaced by pink to flesh colored fruiting structures which contain spores of the fungus (Fig. 4). The fungus may penetrate through the pod wall causing discoloration and distortion of the seeds. At this stage of disease development the fungus can also penetrate the seed coat and become firmly established within the seed. Such infected seeds, when planted, serve as the source of infection for succeeding crops. Infected seed serves as the primary source of inoculum since the fungus infrequently overwinters in Michigan soils.



Figure 1. An area of a field severely infected with the anthracnose fungus.

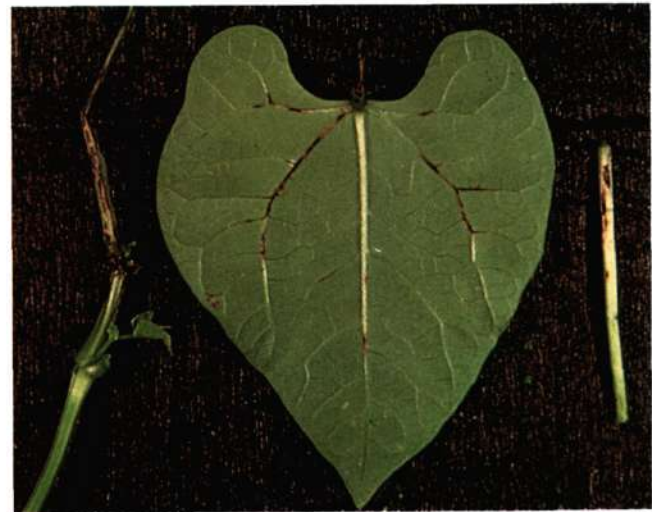


Figure 2. Early symptoms of infection on stems and leaf veins on the leaf underside.

Control

It is important to plant treated, disease-free seed to minimize the risk of anthracnose infection. A one year rotation out of beans is recommended because preliminary studies at MSU indicate the fungus may overwinter. In Michigan most navy (pea) bean cultivars are resistant to the alpha, beta and gamma strains of anthracnose (Table 1). All bean cultivars presently grown in Michigan are very susceptible to the delta strain. Other bean types, such as pinto and black turtle soup, are generally susceptible to the alpha and beta strains.

If anthracnose is found in the field, spread of the disease can be limited by the use of fungicides. Apply captan, copper oxide, tri-basic copper sulfate or copper oxychloride at 7- to 10-day intervals depending on the weather and crop maturity. However, chemical control is dependent on identifying the disease early and will be ineffective once the disease is well established. Chemical control is often erratic and satisfactory control may not be achieved. Consult the package label for dosage rates of the particular chemical you are using.

TABLE 1. Reactions of Dry Bean Varieties to Four Strains of *Colletotrichum lindemuthianum* (Anthracnose).

CLASS AND VARIETY	REACTION TO				
	ALPHA	BETA	GAMMA	DELTA	
<i>Navy</i>	Fleetwood	R	R	R	S
	Neptune	S	R	R	R
	Sanilac	R	R	R	S
	Seafarer	R	R	R	S
	Swan Valley	S	R	R	R
	Tuscola	R	R	R	S
<i>Black</i>	Black Turtle Soup	S	S	S	S
	Black Beauty	S	S	R	S
	Black Magic	S	S	R	R
	Domino	S	S	R	S
	Midnight	S	R	R	R
	T-39	S	S	R	S
<i>Kidney</i>	Charlevoix	R	R	S	S
	Manitou	R	R	S	S
	Mecosta	R	S	S	S
	Montcalm	R	S	S	S
	Red Kloud	S	S	R	S

R = Resistant — No or very little disease



Figure 3. Severe and early infection leads to defoliation and typical pod symptoms.



Figure 4. Pink to flesh colored spores appear in the center of the lesions.