

Studies on Anthracnose Disease of *Dolichos lab-lab*

by

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Synopsis: *Dolichos lab-lab* var. *typicus* is affected by anthracnose disease caused by the fungus *Colletotrichum lindemuthianum* (*Glomerella lindemuthianum*). The infection was very severe on the pods, resulting in drying and shrivelling up of young pods and caused spotting on the mature pods, thus making them unfit for consumption. The intensity of infection varied in different varieties of *D. lab-lab* from 13% to 40%. As a prophylactic measure, Dithane Z. 78 0.15% effectively controlled anthracnose disease of *D. lab-lab*.

Introduction: *Dolichos lab-lab* Linn. is cultivated for the sake of its pods. Two varieties are recognised viz., *Dolichos lab-lab* var. *typicus* and *Dolichos lab-lab* var. *lignosus*. The pods of the former are used as vegetable while in the latter the seeds are used as a pulse. Both the varieties are affected by anthracnose disease - caused by the fungus *Colletotrichum lindemuthianum* (*Glomerella lindemuthianum*), but *D. lab-lab* var. *lignosus* is not very severely affected. The infection was very severe on the pods, resulting in drying and shrivelling up of young pods, and caused spotting on the mature pods, thus making them unfit for consumption. A brief account of the disease and its control on pod infection with fungicides and antibiotics are presented in this paper.

Symptomatology: The disease attacked the cotyledons, leaves, stems, bracts of the inflorescence, sepals and petals of the flowers and pods. It produced its most striking effect on the pods and stems. On the leaves irregular spots of variable size were formed on the upper surface. In the initial stage they were small, but very soon many of them increased in size and measured about 3 mm. to 5 mm. in diameter. Each individual spot had a characteristic appearance. The centre of the lesion was greyish white in colour. Beyond the greyish white portion was a brown margin all round the spot. The spots though visible on both sides of the leaf, were marked on the upper surface. The affected leaves withered quickly and shed. On the stem cankered spots of various sizes were developed. The cankered spots were brown in colour and slightly depressed. Numerous acervuli were arranged in concentric rings on the cankered spots. As a result of the canker, the distal portion of the vine wilted and dried up. Similar cankers of smaller size were observed on the petioles. Apart from the concentric arrangement of acervuli on the stem, small black acervuli were scattered irregularly on the dried infected stem. Stem infection was more common than leaf infection. In some cases all the shoots were killed while in others some shoots escaped. In the months of December and January, the acervuli on the stem became deep black in colour and formed black patches on the stem. This was the symptom of the perfect stage of the fungus. This sort of perithecial formation was formed only on the dried stem, eventhough all the parts of the plants were affected.

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On the pods brick red coloured spots were formed on either sides. The spots were round or irregular in shape. Definite margin around the lesions were not found. Sometimes two or three spots coalesced and formed bigger spots. Pink spore masses were formed in the centre of the spots which were sunken in the middle. When the pods were opened, the lesions on them were often seen to have penetrated right through the pericarp into the seed. On the seed coat discoloured spots were formed. Even on the cotyledons, the lesions were observed as light black patches, irregular in shape. In a badly affected seed, the embryo was affected resulting in failure of germination. Sometimes the pods looked healthy externally without any lesions, but when the pods were opened, the seeds inside were affected thus showing the internal nature of infection.

Previous Work: Literature pertaining to anthracnose of *Dolichos lab-lab* is very meagre. In India anthracnose of *D. lab-lab* has been reported by Butler (1917). Subramaniam (1953) has described the same disease from Coimbatore and has identified the pathogen as *Colletotrichum lindemuthianum*.

Materials and Methods: Field observations were made at the Millets Breeding Station, Coimbatore on the following 8 varieties of *Dolichos lab-lab* viz., DL. 244, DL. 453, DL. 692, DL. 269, DL. 389, DL. 9413, DL. 279 and DL. 259. Percentage of infection was assessed after counting 100 pods at random in each variety.

A field experiment was conducted at the Millets Breeding Station, Coimbatore, to find out the efficacy of different fungicides and antibiotics to control anthracnose disease of *D. lab-lab*. The most susceptible variety DL. 453 was selected for this study. The treatments were both prophylactic and curative. As a prophylactic, the following fungicides and antibiotics were sprayed first on the pods and after 20 hours, spore suspension of *Colletotrichum lindemuthianum* isolated from DL. 453 was sprayed on the pods and covered with alkathene bags for three days to give sufficient moisture for inducing infection. Water was sprayed once in a day.

Fungicides: Dithane Z.78 0.15% (Zinc ethylene bis dithio carbamate), Phygon 0.25%, Cupramar 0.3%, Cuprous oxide 0.35% and Bordeaux mixture 1%.

Antibiotics: Griseofulvin 0.1% and Phytomycin 500 ppm.

The above treatments were replicated three times with suitable control. Four pods were taken for each replication. Infection counts were recorded after ten days. As a curative measure, the spore suspension of *C. lindemuthianum* was first sprayed on the pods and after 24 hours the same fungicides and antibiotics used in the case of prophylactic treatment were sprayed and infection counts were recorded.

Results: Observations recorded on the incidence of anthracnose disease on the eight varieties of *Dolichos lab-lab* are furnished below.

S. No.	Varieties	Pod infection %	S. No.	Varieties	Pod infection %
1.	DL. 244	35	5.	DL. 389	30
2.	DL. 453	40	6.	DL. 9413	20
3.	DL. 692	30	7.	DL. 279	13
4.	DL. 269	38	8.	DL. 259	33

The incidence of infection varied in intensity in different varieties of *Dolichos lab-lab*. The infection percentage ranged from 13 per cent to 40 per cent. DL. 453 was the most highly susceptible variety recording 40 per cent infection while in other varieties the infection was less and the variety DL. 279 recorded the least incidence of 13.

Prophylactic: It is interesting to note that in all the replications, Dithane Z. 78 treated pods were not infected, thus proving this fungicide to be very effective in controlling anthracnose disease of *D. lab-lab*. As it recorded 'nil' infection in all the replications, the data regarding Dithane are not included in the statistical analysis. The data with regard to the remaining treatments were subjected to statistical analysis and found to be significant. The results are presented below.

Effect of fungicides and antibiotics in the control of anthracnose of D. lab-lab.

S. No.	Treatments	Percentage of pod infection			Mean transformed value	S. E. of Mean	C. D. (P=00.5)
		Rep I	Rep II	Rep III			
1.	Dithane Z. 78 (0.15%)	0	0	0			
2.	Phygon (0.25%)	50	100	50	60		
3.	Cupramar (0.3%)	25	25	50	35		
4.	Cuprous oxide (0.35%)	25	50	0	25		
5.	Bordeaux mixture (0.1%)	25	25	50	35	10.29	
6.	Griseofulvin (0.1%)	0	0	25	10		
7.	Phytomycin (50 ppm.)	75	75	75	60		
8.	Control (no treatment)	100	75	100	80		

Conclusions: S, 7, 2, 3, 5, 4, 6

The results showed that the prophylactic treatments of pods with all the fungicides and antibiotics except Phytomycin and Phygon proved markedly efficacious in reducing pod infection. The efficacy of the latter two treatments however, failed to reach the level of statistical significance.

Curative Measure: None of the fungicides and antibiotics tested proved to be effective in controlling the disease as a curative measure, since cent per cent infection was recorded in all the treated series as well as control.

Discussion: Results obtained in the fungicidal experiment have proved that as a prophylactic measure Dithane Z. 78 (0.15%) is very effective in controlling anthracnose disease of *Dolichos lab-lab*. Cupramar (0.3%), Cuprous oxide (0.35%), Bordeaux mixture (1%) and Griseofulvin (0.1%) have also been found to be efficacious in reducing pod infection.

Cox (1950), from field spray tests has found that weekly application of Dithane Z. 78 or Phygon controls anthracnose of *Phaseolus lunatus*. The present investigations reveal that Phygon is ineffective for controlling anthracnose of *D. lab-lab*. Mc New (1944) has recommended Zineb (=Dithane Z.78) as it causes the least risk to consumer from residues on the pods. Bruinsma and Labruyere (1953) have reported that four to six applications per season of Dithane Z. 78 (1 in 200) effectively controlled bean anthracnose at a reasonable cost. Hadorn (1944) has recommended two to three applications of copper mixture or copper sandoz to prevent stem and leaf infection of anthracnose of beans. Reid and Taylor (1945) have recommended four applications of Bordeaux mixture 6-8-100 or four of Cuprox (5 lb. in 100 gl.) for reducing the incidence of anthracnose of bean. Bremer (1955) has stated that the control of bean anthracnose with Zineb and Captan results in promising difference in the number of healthy pods. Staples (1958) has reported that anthracnose of beans is controlled by thiram, maneb and Zineb applied at and shortly after flowering. Ark (1959) has stated that anthracnose of bean is effectively controlled by sprays of 1 to 20% aqueous extract of garlic.

In the present investigations though none of the fungicides and antibiotics is found to be effective in controlling anthracnose of *D. lab-lab* as a curative measure, Dithane Z. 78 (0.15%) has proved to be very effective as a prophylactic measure.

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