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SURVIVAL OF *COLLETOTRICHUM CAPSICI* (SYD.) BUTLER AND BISBY WITH URD BEAN (*PHASEOLUS MUNGO* L.) SEEDS

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SEED plays a vital role in the production of healthy crop. Seed-borne disease of urd bean like anthracnose, can reduce the yield to a considerable extent. Anthracnose caused by *Colletotrichum capsici* (Syd.) Butler & Bisby was first observed[1] on *Phaseolus mungo* L. Urd bean is one of the major pulse crops of Northern India, and not much work has been done on *C. capsici*, so it was thought desirable to study the role of seed in perpetuation of anthracnose disease in the prevailing Pantnagar conditions. The present work comprises the aspects of survival of *C. capsici*, germination percentage of infected seeds and comparison between blotter paper and agar plate methods. This study confirms the above mentioned aspects of *C. capsici*, unknown till to date on urd bean.

During September 1983, seeds from severely infected pods of urd bean (variety Pant U-19) were collected, dried and stored at 5 C in a polythene bag. The same seed lot was used throughout the experiment each month starting from September, 1983 to August 1984. Twelve hundred seeds were tested by blotter and agar plate methods, each, as recommended by Neergaard and Saad[2], and International Seed Testing Association[3]. Potato dextrose agar medium was used in the agar plate method for plating the sterilized seeds. All petri plates were incubated at 25 ± 1 C for 7 days in an incubator. Subsequently, the fungal infection was observed after 7 days by microscope and sometimes with the help of stereobinocular.

Infected seeds were soaked overnight (for 16 h) in distilled water and then placed in plastic petri plates lined with moist filter paper (Whatman No. 1) under laboratory conditions (25 ± 1°C). Germination was recorded after 10 days for each month.

The data reveal that the fungus was readily isolated from seeds, immediately after harvest, i.e. from September 1983 to as late as August 1984 (table 1). The percentage of seeds that yielded the fungus varied (from 11 to 28%) in unsterilized and (8–24%) in sterilized seeds by the blotter paper method. Agar plate method, on the contrary reported a lower (3–19%) fungal population. Germination range of infected seeds was 46–76%. However, the difference is significant between the initial and last stages of the experiment.

Unsterilized seeds exhibited 20.25% pathogen (table 2). In contrast to unsterilized seeds, 16.25% of

Table 1 *Isolation frequency of C. capsici and germination percentage of stored urd bean seed by monthly interval*

Months	Percentage of *C. capsici* yielded from seeds: Blotter paper: Unsterilized seeds	Blotter paper: Sterilized seeds	Agar plate method	Per cent germination of seeds
Sept (1983)	28	22	19	46
Oct.	27	23	16	47
Nov.	27	24	16	53
Dec.	28	24	15	56
Jan. (1984)	22	17	15	54
Feb.	21	18	12	63
Mar.	18	15	12	62
April	17	13	8	72
May	17	13	7	71
June	14	10	8	68
July	13	8	4	74
Aug.	11	8	3	76
C.D. at 5%	3.91	3.68	3.02	5.85

Table 2 *Per cent recovery of Collectotrichum capsici with urd bean seeds (No. of seeds planted: 1200)*

Treatments	No. of seeds yielded *C. capsici*
Blotter paper method	
(a) Unsterilized seeds	243 (20.25%)
(b) Sterilized seeds	195 (16.25%)
Agar plate method (sterilized seeds)	135 (11.25%)

pathogen was recorded in sterilized seeds by the blotter paper method. However, the difference is marginal. But it indicates the vital role of seed surface as a carrier of pathogen from one season to the next. Further, the difference in population of the fungus by the blotter and agar plate methods was 20.25% and 11.25% respectively (table 2). The blotter paper yielded more test fungus because in the agar plate method, there are greater chances for the growth of other saprophytes which may utilize the available nutrients from the medium and act as a competitor to the test fungus[4].

The present findings clearly show that the disease perpetuates through infected seeds which is earlier reported in several *Collectotrichum* spp. with many host plants[5,7]. However, *Collectotrichum* spp. can survive with urd bean seed up to 5 years[8]. But in the present study, the pathogen was isolated only for one year. The present observations indicate the potentiality of urd bean seed as a carrier of primary inoculum.

Germination percentage gradually increased with the increase in the storage period. The increase in germination was inversely proportional to the number of seeds carrying viable inoculum. Initially, germination was less, probably due to the maximum density of the active fungus or dormancy of the seeds.

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STRUCTURE, ONTOGENY AND SECRETION OF OIL SECRETING GLANDS IN *HIPTAGE ACUMINATA* WALL.

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VOGEL[1] reported the occurrence and function of oil secreting glands in Malpighiaceae and noted for the first time that oil acts as a primary pollinator attractant in plants of this family. Similar glands in *Krameria* (Krameriaceae) are found to secrete oil which contains β-acetate-substituted free acids[2]. Studies on the structure and secretion of lipophilic glands are meagre. The present paper reports the structure, development and secretion of lipophilic glands in *Hiptage acuminata*.

Lipophilic glands at various stages of development were collected from *Hiptage* plants in the University Botanical Garden. The glands were processed for histology and sections 6–8 μm and 1 μm thick were cut and stained. Observations and photomicrography were carried out using a Carl-Zeiss Photomicroscope-1 and a Carl-Zeiss epifluorescence microscope using u.v. range filters.

The lipophilic glands are greenish-yellow and are found at the base of each of the five sepals (figure 1A). Each gland is bifid and kidney-shaped (figure 1B) and originates from a group of epidermal and sub-epidermal cells on the abaxial surface of the sepal (figure 1C, D). The epidermal cells divide anticlinally and give rise to a single-layered secretory palisade-like epithelium. The sub-epidermal cells divide in all planes and form the sub-epithelial tissue. The epithelial cells are elongated, palisade-like, darkly stained and contain granular cytoplasm (figure 1E, F). A branch of vascular bundle from the pedicel diverges into the sub-epithelial tissue (figure 1E). It is mainly composed of phloem. Observations using epifluorescence microscopy confirmed the presence of lipid in the epithelial cells during secretion (figure 1G). Thin-layer chromatography indicated the presence of fatty acids and sitosterol components. In addition, two lower spots, probably indicating short-chain fatty acids, were also detected. They are yet unidentified. During secretion the lipophilic material accumulates beneath the cuticle lifting the cuticle from the epithelial cells. Finally the cuticle breaks open to release the secretion.

In the Malpighiaceae the Old World representa-