

Original Research Article

<https://doi.org/10.20546/ijcmas.2020.905.417>

Seed Health Evaluation of Different Varieties of Indian Bean by Incubation Method (Roll Paper Towel)

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ABSTRACT

Five varieties of Indian bean and one local variety were taken in the investigation to assess the seed health evaluation by roll paper towel method. The seeds were placed on moist paper towel at equidistance and covered with another moist paper towel and rolled carefully without disturbing the already arranged seeds. Tie the towel with rubber band at both the ends. Incubate it for four to five days at room temperature. Examine normal and abnormal seedlings, cause of abnormalities, failure in germination and ungerminated seeds by naked eye and presence of mycoflora by stereo-binocular microscope. Maximum frequency of mycoflora were recorded from local variety seed lot (99.98%) and IS- 12 variety showed minimum frequency of mycoflora (92.84%).

Keywords

Indian bean, Roll paper towel, Seed borne mycoflora

Article Info

Accepted:
25 April 2020
Available Online:
10 May 2020

Introduction

Indian bean or field bean (*Lablab purpureus* L.) is predominantly self-fertilizing and its chromosome number is $2n=22$. It is short lived creeping perennial but used as an annual legume. Indian bean is one of the most ancient crops among cultivated plants. Indian bean locally known as 'Sem' belongs to the family Fabaceae subfamily Papilionaceae (Dhaliwal, 2008). Other names for this legume are dolichos bean, lablab bean, hyacinth bean, Egyptian bean, Sembean, Lubia bean (Sudan) and Egyptian kidney bean

(Purseglove,1968). The species is extremely diverse and taxonomically three sub-species are recognized, mainly based on differentiating characteristics of pods and seeds.

Indian bean is presently grown throughout the tropical regions in Asia, Africa and America. In Chhattisgarh, beans occupies an area of 7828 hectare with the production of 94415 million tonne with an average productivity 12 milliontonne/hectare during the year 2017-18 (Krishi Darshika, 2019). In India, the important growing states are Uttar Pradesh,

Madhya Pradesh, Haryana, West Bengal, Tamil Nadu, Telangana, Andhra Pradesh, Karnataka and Maharashtra (Dhaliwal, 2008). In North East India, its tender pod is a popular vegetable and it is mostly grown as a backyard crop and occasionally sold on limited scale for local market during winter (Sarma *et al.*, 2010). A large number of indigenous land races are found scattered all over North East India, distinguished primarily on the basis of pod morphology and pod coloration. The consumer preference varies with pod size, shape, colour, softness and aroma.

Indian bean is a multipurpose crop grown for pulse, vegetable for human consumption and also used as forage for animals (Murphy and Colucci, 1999). Compared to many other vegetables, Indian bean pods have longer shelf life (Sarma *et al.*, 2010). In addition to food and forage crop, Indian bean is often grown as a weed suppressor and as a cover crop to avoid soil erosion or as a green manure crop. Indian bean is a versatile crop which can be cultivated in a range of climates and soil types (Pengelly and Maass, 2001). It is a cool season crop that responds to photoperiod. The seeds of Indian bean have a greater nutritive value having 3.8g/100g of protein, 6.7g/100g of carbohydrate, 0.7g/100g of fat, 1.8g/100g of fibre, oxalic acid 1 mg/100 g and vitamin A- 312 IU.

Diseases are the major constraint in economic crop production as they inflict heavy losses. Like other crops, Indian bean is also attacked by many diseases during seed germination to seed production and maturity. The crop is affected by many fungal diseases viz., anthracnose (*Colletotrichum lindemuthianum*), rust (*Uromyces appendiculatus*), powdery mildew (*Erysiphe polygoni*), ash blight and charcoal rot (*Macrophomina phaseolina*), leaf spot (*A. tenuissima*), bacterial disease viz., bacterial

blight (*Xanthomonas phaseoli*) and viral diseases viz., bean common mosaic (BCM) and bean yellow mosaic (BYM) (Bose *et al.*, 2001).

The roll paper towels containing seeds were incubated in dark at suitable temperature for fixed period of time. The seeds were examined after incubation for the presence of micro-organisms and germination. This method is used for the detection of various seed borne mycoflora of seeds of Indian bean varieties.

Materials and Methods

The seeds were placed on moist paper towel (25-50) at equidistance and covered with another moist paper towel and rolled carefully without disturbing the already arranged seeds. Tie the towel with rubber band at both the ends. To avoid water loss, used polythene or wax coated paper wrapping the rolled paper towels containing seeds. Incubate it for four to five days at room temperature. Examine normal and abnormal seedlings, cause of abnormalities, failure in germination and ungerminated seeds by naked eye and presence of mycoflora by stereo-binocular microscope. The observations were recorded for-

Normal seedlings show the potential for continued development into satisfactory plants when grown in good quality soil and under favorable conditions of temperature, light and moisture.

Categories

Intact seedlings—seedlings with all their essential structures well developed, complete in proportion and healthy.

Seedlings with slight defects—seedlings showing slight defects of their essential

structures provided they show a satisfactory and balanced development comparable to that of intact seedlings of the same test.

Seedlings with secondary infection - seedlings as described above but have been affected by fungi or bacteria from sources other than the parent seed.

Abnormal seedlings- do not show the potential to develop into a normal plant when grown in good quality soil and under favorable condition of moisture, temperature and light.

Categories

Damaged – seedlings with any of the essential structures missing or badly and irreparably damaged that balance development cannot be expected.

Deformed or unbalanced – seedlings with weak development or physiological disturbances or in which essential structures are deformed or out in proportion.

Decayed – seedlings with any of their essential structures so diseased or decayed as a result of primary infection that normal development is prevented.

Ungerminated seeds-did not germinate at the end of the test period.

Categories

Hard seeds – seeds which have not absorbed water thus remain. Hard after the end of the test period.

Fresh seeds – seeds able to imbibe water but which failed to germinate under the condition of the germination test remains clean and firm and have the potential to develop into a normal seedling.

Dead seeds – seeds at the end of the test period are neither hard nor fresh, failed to proof a seedling; usually soft, discolored, frequently moldy.

Others- empty, embryo less seeds, insect damaged seeds.

Results and Discussion

Seed lot of six varieties of Indian bean were examined for associated seed borne mycoflora in varying frequencies with normal seedling, abnormal seedling and ungerminated seeds by roll paper towel method. It was observed that presence of mycoflora may be the cause of abnormalities and failure in germination. In this method, mycoflora were found associated with seeds and seedling of Indian bean varieties. Maximum frequency of mycoflora were recorded from local variety seed lot (99.98%) and mycoflora detected were *Aspergillus flavus* (36.84%), *Curvularia lunata* (26.31%), *Alternaria alternata* (21.05%) and *Aspergillus fumigatus* (15.78%) and germination percentage recorded (90%) followed by frequency of mycoflora in IS-2 (98.25), IS-29 (96.99%), IS-1 (96.06%), IS-96 (95.22%) and IS-12 (92.79%) and germination percentage recorded in all these Indian bean varieties were 70, 90, 90, 80 and 60, respectively.

In seeds of IS-2 variety mycoflora were detected as *Alternaria alternata* (38.26%), *Fusarium* sp. (33.33%) and *Aspergillus flavus* (26.66%). In IS-29 variety associated mycoflora detected as *Alternaria alternata* (41.62%), *Fusarium* sp. (30.37%) and *Aspergillus fumigatus* (25%). Mycoflora detected in IS-1 as *Aspergillus fumigatus* (42.46%), *Aspergillus flavus* (30.33%) and *Fusarium* sp. (23.27%). Seed lot of IS-12 variety mycoflora was detected as *Aspergillus flavus* (42.45%), *Alternaria alternata* (26.27%) and *Fusarium* sp. (24.12%). IS- 96

variety showed minimum frequency of mycoflora (85.22%) includes *Aspergillus terreus* (33.33%), *Alternaria alternate* (28.57%), *Fusarium* sp. (19.04%) and *Aspergillus fumigatus* (14.28%).

Table.1 Detection of mycoflora associated with seeds of Indian bean varieties by roll paper towel method

S.No	Varieties	Germination (%)	Frequency of mycoflora associated (%)						Total frequency (%)
			<i>A. flavus</i>	<i>A. fumigatus</i>	<i>A. terreus</i>	<i>Curvularia lunata</i>	<i>A. alternata</i>	<i>Fusarium</i> sp.	
1	IS – 1	90	30.33	42.46	-	-	-	23.27	96.06
2	IS – 2	70	26.66	-	-	-	38.26	33.33	98.25
3	IS – 12	60	42.45	-	-	-	26.27	24.12	92.84
4	IS – 29	90	-	25.00	-	-	41.62	30.37	96.99
5	IS – 96	80	-	14.28	33.33	-	28.57	19.04	95.22
6	Local variety	90	36.84	15.78	-	26.31	21.05	-	99.98
Total mycoflora			136.28	97.52	33.33	26.31	157.51	130.13	

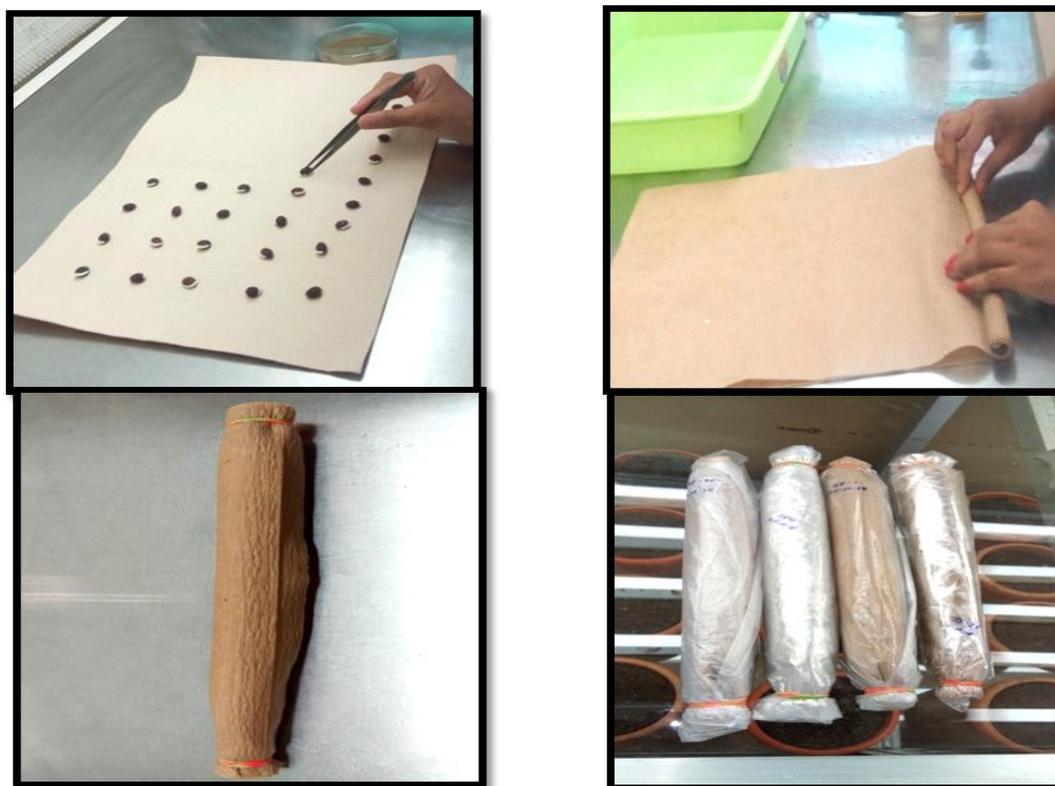
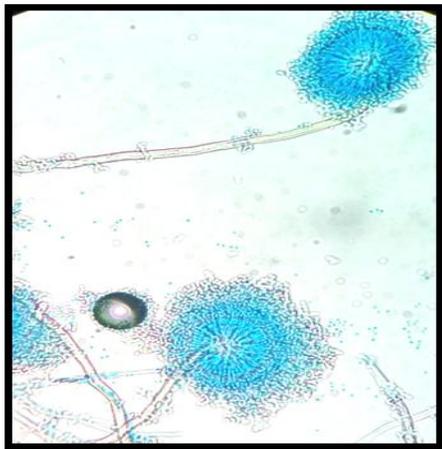
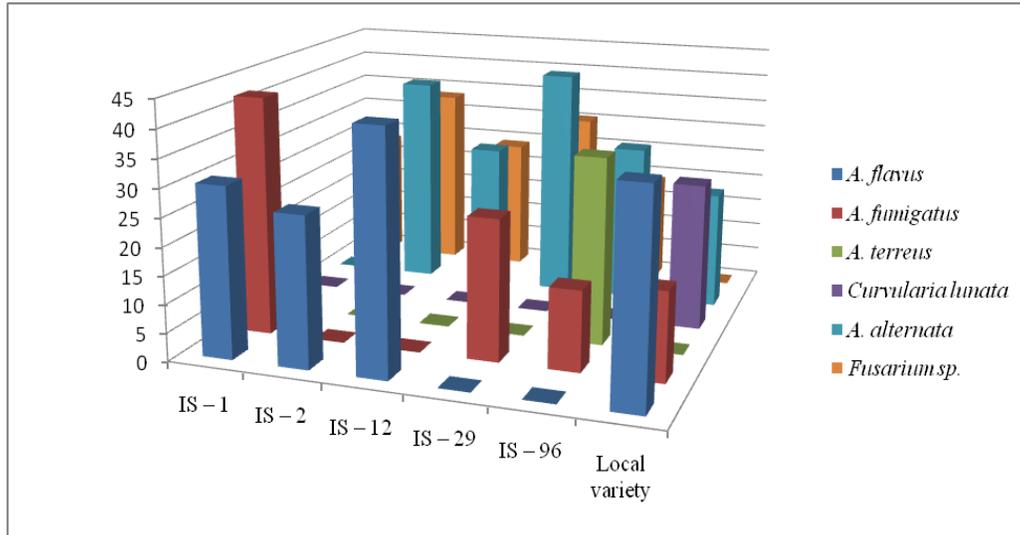


Plate.1 Roll paper towel method

Fig.1 Detection of mycoflora associated with seeds of Indianbean varieties by roll paper towel method



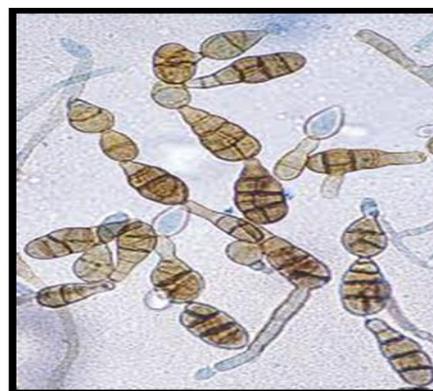
A. flavus



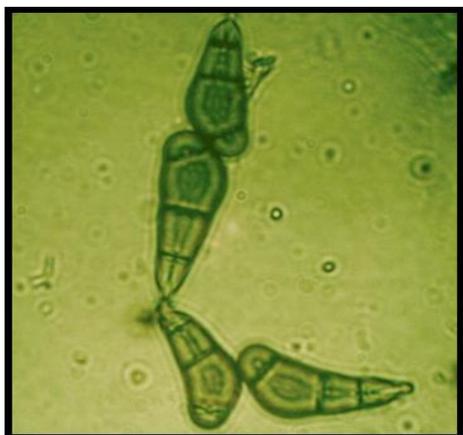
A. fumigatus



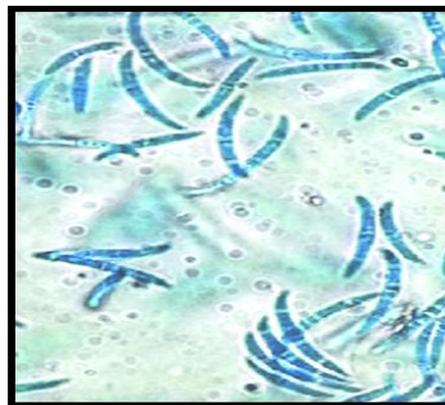
A. terreus



Alternaria alternata



Curvularia lunata



Fusarium sp.

Relative abundance *Alternaria alternata* (157.51%) was maximum followed by *Aspergillus flavus* (136.28%) and *Fusarium* sp. (130.13%).

Commonly occurring seed borne mycoflora found associated with seeds of chickpea and pigeonpea were reported by Singh *et al.*, (2014) and seed borne mycoflora of pigeonpea by Pradhan (2014) were in conformity with the findings of present study in which most common fungi in varying frequencies and their impact on germination were recorded.

Pradhan (2014) detected mycoflora in pigeonpea by roll towel method namely *Aspergillus flavus*, *A. niger*, *A. fumigatus*, *A. sp.*, *Penicillium* sp., *Mucor* sp., and *Fusarium udum*. Singh *et al.*, (2014) observed that mycoflora in wheat, paddy, pigeonpea and chickpea and Kesharwani (2018) in different pea varieties and mycoflora detected were *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus fumigatus*, *Trichoderma* sp., *Alternaria* sp., *Curvularia* sp., *Chaetomium* sp. and *Rhizopus* sp. by rolled paper towel method. Findings of present investigation are in agreement of finding of earlier researchers.

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How to cite this article:

Kiran Pradhan and Lakpale, N. 2020. Seed Health Evaluation of Different Varieties of Indian Bean by Incubation Method (Roll Paper Towel). *Int.J.Curr.Microbiol.App.Sci.* 9(05): 3510-3516. doi: <https://doi.org/10.20546/ijcmas.2020.905.417>