# Detection of Seed-Borne Fungi in Mungbean and Blackgram Seeds

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## Abstract

An experiment was undertaken to identify the seed borne fungi of mungbean and blackgram and subsequently determine their effect on germination of seeds. Seed samples of six mungbean and two blackgram varieties were collected from different crop research institutes of Thailand. Blotter method was employed for the identification. Altogether 13 forms of fungi were found in the seed samples. Among them, *Aspergillus flavus, Aspergillus niger, Aspergillus terreus, Alternaria sp., Curvularia sp., Fusarium sp., Macrophomina phaseolina*, and *Penicillium sp*.,were predominent. *Macrophomina phaseolina* reduced the germination significantly. It also caused post-emergence damping off, death of emerging radicle, and discolouration of roots, hypocotyles and cotyledons.

**Keywords :** Seed-Borne Fungi, Blackgram, Seed Pathogen

## Introduction

Mungbean (*Vigna radiata* (L.) Wilczek) is one of the most important legumes of the arid and semiarid tropics (Chen et al., 1987). Blackgram (*Vigna mungo* (L.) Hepper) is a closely relative species of mungbean. They both are excellent source of easily digestible protein. Several factors are responsible for low production of mungbean and blackgram. Among them, diseases play an important role (Nine, 1980; Pal, 1996). Many fungal pathogens, some of which are seed transmitted, often reduce the germination ability or kill the infected plants or substantially reduce the productive capacity. However, published reports of seed-borne fungi of mungbean and blackgram in Thailand are very few. Hence the study was undertaken to investigate percentage incidence of seed-borne fungi associated with mungbean and blackgram seeds and to determine its detrimental effects on seed germination.

## Materials and Methods

Eight seed samples were obtained from different research institutes of Thailand. The samples composed six varieties of mungbean which were Chai Nat 60, Chai Nat 36, Khampen saen 2, MoO 1, No.1 and No.2, and two varieties of blackgram namely Uthong 2 and Phitsanulok 2. Seed samples were analyzed by 'blotter method' following International Rules for Seed Health Testing (ISTA, 1976). After 7 days of incubation, the germination and the prevalence of the pathogens with seeds were recorded. The pathogens were detected on the basis of their growth character on the incubated seeds in blotter under stereo-binocular microscope and the

pathogens were confirmed after preparing slides and examining under the compound microscope.

## Results and Discussion

Various fungi and their mean percentage incidence in different varieties of mungbean and blackgram seeds are presented in Table 1. In all, 13 different forms of fungi were found associated with the tested samples. *Aspergillus flavus, Aspergillus niger, Aspergillus terreus, Alternaria sp., Curvularia sp., Fusarium sp., Macrophomina phaseolina and Penicillium sp.* were associated with all varieties. *Cladosporium sp., Colletotrichum sp., Drechslera sp, Myrothecium sp and Rhizopus sp.* were found in 5, 2, 2, 2 and 5 varieties respectively.

Table 1. Percentage of fungi associated with the seeds of eight different mungbean and blackgramvarieties in blotter test.

| Variety / Fungi | Mungbean varieties | | | | | | Blackgram varieties | |
|---|---|---|---|---|---|---|---|---|
| | Chai Nat 60 | Chai Nat 36 | Khampen saen 2 | MoO 1 | No. 1 | No. 2 | Uthong 2 | Phitsanulok-2 |
| **Aspergillus flavus** | 5.0 | 35.25 | 13.25 | 4.25 | 18.5 | 10.75 | 7.75 | 5.75 |
| *Aspergillus niger* | 7.0 | 29.25 | 31.75 | 14.5 | 14.75 | 45.25 | 10.25 | 6.25 |
| *Aspergillus terreus* | 12.25 | 5.5 | 9.75 | 1.25 | 3.75 | 2.25 | 1.0 | 7.0 |
| *Alternaria sp.* | 3.25 | 20.25 | 5.5 | 0.5 | 0.5 | 4.25 | 2.25 | 1.5 |
| *Cladosporium sp.* | 8.0 | 13.25 | 0.25 | 0.0 | 3.25 | 0.0 | 0.5 | 0.0 |
| *Curvularia sp.* | 4.0 | 3.0 | 1.75 | 2.5 | 3.5 | 0.5 | 13.25 | 17.0 |
| *Fusarium sp.* | 11.5 | 10.5 | 1.75 | 1.5 | 1.0 | 0.5 | 6.25 | 28.75 |
| *Macrophomina phaseolina* | **29.75** | **6.25** | **9.75** | **12.5** | **2.0** | **3.75** | **24.0** | **27.25** |
| *Penicillium sp.* | 21.0 | 4.5 | 4.25 | 1.5 | 4.25 | 5.5 | 4.25 | 6.0 |
| *Colletotrichum sp.* | 4.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.75 |
| *Drechslera sp.* | 0.75 | 0.0 | 0.0 | 0.25 | 0.0 | 0.0 | 0.0 | 0.0 |
| *Rhizopus sp.* | 4.5 | 6.75 | 5.0 | 0.0 | 6.25 | 2.0 | 0.0 | 0.0 |
| *Myrothecium sp.* | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.25 |
| Germination | **58.25** | **80** | **74** | **71.0** | **94.25** | **90.0** | **66.5** | **63** |

In all varieties, incidence of *Macrophomina phaseolina* was found as a major cause of germination reduction (Figure 1. & Figure 2.). Most of the cases only radicle initiated development but had failed to survive; no hypocotyle extension or cotyledonary leaves developed. It was also observed that the emerged radicle after decaying developed numerous typical pycnidial black spots that made the seedlings or sprout blemish (Figure 2.). It was also reported earlier in blackgram and because of that Thai blackgram is often complained by the importers (Pichitporn and Thavarasook, 1990; Putasamai and Surin, 1988). In soybean (Gangopadhyay et al., 1970) and sunflower (Raut, 1983) seeds the effect of *Macrophomina phaseolina* was reported and they also described the similar symptoms.


**Figure. 1.**: *Macrophomina phaseolina* infected mungbean seed with pycnidia.


**Figure 2.**: *Macrophomina phaseolina* infected blackgram seed with dead radicle and numerous.

The higher percentages of some fungi caused germination declining to a lesser extent in some varieties like *Alternaria sp*. in Chai Nat 36, *Curvularia sp.* in Uthong 2 and Phitsanulok 2, and *Fusarium sp*. in Phitsanulok 2.

The high incidence of *Aspergillus flavus*, *Aspergillus niger* and *Aspergillus terreus* did not show adverse effect on germination.

## Conclusion

Thirteen forms of fungi were detected in mungbean and blackgram cultivars grown in Thailand. *Macrophomina phaseolina* manifested pre and post emergence mortality and thereby rendering the sprouts unfit for consumption.

## References

Chen, C.Y., Tsou S.C.S. and Wang, H.H., (1987). Utilization patterns of mungbean in the Chienese diet. *In* Mungbean- Proceedings of the Second International Symposium, Bangkok, Thailand. AVRDC tropical vegetable information service.

Gangopadhyay, S.; Wyllie, T.D. and Luedders, V.D., (1970). Charcoal rot disease of soybean transmitted by seeds. Plant Disease Reporter. 54 (12), pp.1088-1091.

ISTA. (1976). International Rules for Seed Testing. International Seed Testing Association. Seed Science & Technol. 4, pp.3-177.

Nine, Y.L., (1986). Opportunities for research on diseases of pulse crops. Indian Phytopathology. 39 (3), pp.333-342.

Pal, M., (1996). Pulse disease scenario. Indian Phytopathology. 49 (2), pp.129-131.

Pichitporn, S. and Thavarasook, C.,(1990). Blackgram cultivars in Thailand. *In* Proceedings of the mungbean meeting '90, Thailand. pp.13-15.

Putasamai, K. and Surin, P., (1988). Charcoal rot of blackgram. *In* 3rd report of soybean ressearch. 22-23 Nov. 1988. (in Thai).

Raut, J.G., (1983). Transmission of seed-borne *Macrophomina phaseolina* in sunflower. Seed Sci. & Technol. 11, pp.807-814.