



RESEARCH ARTICLE

PATHOLOGY

FUNGI ASSOCIATED WITH CHICKPEA, LENTIL AND BLACKGRAM SEEDS OF RAJASTHAN

TRIPTI AGARWAL^{*1} ABHINITI MALHOTRA¹ AND P. C. TRIVEDI¹

¹Department of Botany, University of Rajasthan, India.



TRIPTI AGARWAL

Department of Botany, University of Rajasthan, India.

ABSTRACT

The study aims at identifying pathogenic fungi associated with chickpea (*Cicer arietinum* L.), lentil (*Lens culinaris*) and black gram (*Vigna mungo* (L.) seeds. Seed health testing is a pre requisite for seed improvement, seed production, seed certification and trade in seed. Direct analysis of seed has been a much more effective means of identifying infected seed lots than the field inspection required for phytosanitary certification. Samples of chickpea, lentil and black gram seeds are collected from local districts of Rajasthan and are analyzed for seed-borne fungi. The fungi isolated from these seeds are *Alternaria alternata*, *Chaetomium spp.*, *Penicillium citrinum*, *Aspergillus niger*, *A. flavus*, *Rhizopus nigricans*, *Fusarium oxysporum*.



KEY WORDS

Cicer arietinum L., *Lens culinaris*, *Vigna mungo*, phytosanitary, seed-borne

INTRODUCTION

Plants are extremely important in the lives of people throughout the world. They have always been looked upon as a key source of energy for survival and evolution of the animal kingdom, thus forming a base for every ecological pyramid. The legumes or pulses belong to the family Fabaceae (Leguminous) characterized by having a special kind of fruit, a legume. Nearly 11,000 species of legumes are known and many are of importance as industrial, medicinal food plants. Considering the nutritional, agronomical and industrial value of pulses and yield of legumes, the present study aims to study the seed borne fungal pathogens of three important pulse crops of Rajasthan namely chick pea [*Cicer arietinum* (L.)] lentil (*Lens culinaris* Medik.) and black gram (*Vigna mungo*).

Chickpea (*Cicer arietinum* L.), commonly known as 'gram', is the most important legume grown in India and grown over 6.66 m ha of land.¹ It has been found to be attacked by 172 pathogens including 67 species of fungi.² Chickpea suffers from a large number of fungal diseases namely Ascochyta blight (*Ascochyta rabiei*), Fusarium wilt (*F. oxysporum*), dry root rot (*R. bataticola*) Alternaria blight (*A. alternata*), Colletotrichum blight (*C. dematium*), Stemphylium blight (*Stemphylium sarciniforme*), powdery mildew (*Leveillula taurica*), Sclerotinia stem rot (*Sclerotinia sclerotiorum*), wet root rot (*R. solani*), and foot rot (*Operculella padwickii*)^{3,4}.

In the same way, lentil is also used for human consumption as a protein source in a diverse range of product and is an excellent source of vitamin A and provides fiber, potassium, B vitamins, and iron.¹ Some important seed-borne

fungal disease of lentil are Ascochyta blight (*Ascochyta lentis*), gray mould (*Botrytis cinerea*), collar rot (*Sclerotium rolfsii*) and Fusarium wilt (*Fusarium oxysporum* f. sp. *lentis*)^{5,6}. In the same manner, black gram (*Vigna mungo* (L.) Hepper) is very nutritious and is recommended for diabetics, as are other pulses. Blackgram is a closely relative species of mungbean.

All these varieties of pulses are excellent source of easily digestible protein. But there are several factors which are responsible for their low production. Among them, diseases play an important role.^{7,8} 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. Some of these fungi produce aflatoxins which damage the liver and induce carcinogenic, mutagenic and teratogenesis.⁹ Therefore, control of seed-borne fungi is extremely important and the damaging effects can be relieved through integrated approaches.¹⁰ Hence the study has been undertaken to investigate percentage incidence of seed-borne fungi associated with chickpea, lentil and blackgram seeds.

MATERIALS AND METHOD

All seed samples were collected from different localities of Rajasthan viz Ajmer, Alwar, Bharatpur, Jaipur and Kota. From each sample 200 seeds were tested. Two methods, blotter and potato dextrose agar, recommended by ISTA (1966) were used. For the standard blotter method, untreated seeds and seeds after



treatment with 0.1% Sodium Hypochlorite for 10 minutes were placed on three layers of moistened blotter, 10 seeds per Petri dish. The plates were then incubated in B.O.D incubator at $25 \pm 2^\circ\text{C}$ for 8 days under 12 hrs alternating cycles of light and darkness. The treated and untreated seed components were plated on PDA in the same way for Agar method. Thus, the

exposed seeds were examined on the 9th day under stereo binocular microscope for the presence of seed borne pathogens if any. The method suggested by Mathur *et al.*, (1975)¹¹ was used to detect the location of seedborne fungi with slight modification.

Table 1
Seed samples of Chickpea in Dry seed examination and incubation tests (SBM and PDA) in various districts of Rajasthan

Districts	No. of samples collected	No. of samples Studied		
		Dry seed examination	SBM	PDA
Ajmer	7	7	7	2
Alwar	13	13	13	7
Bharatpur	9	9	9	4
Jaipur	15	15	15	8
Sikar	5	5	5	2
Total	49	49	49	23

Table 2
Seed samples of Lentil in Dry seed examination and incubation tests (SBM and PDA) in various districts of Rajasthan

Districts	No. of samples collected	No. of samples Studied		
		Dry seed examination	SBM	PDA
Ajmer	7	7	7	3
Alwar	10	10	10	5
Bharatpur	4	4	4	4
Jaipur	9	9	9	4
Sikar	7	7	7	4
Total	37	37	37	20

Table 3
Seed samples of Black gram in Dry seed examination and incubation tests (SBM and PDA) in various districts of Rajasthan

Districts	No. of samples collected	No. of samples Studied		
		Dry seed examination	SBM	PDA
Ajmer	5	5	5	2
Alwar	10	10	10	6



other two. On an average black gram seeds had lesser infestation. *A.niger*, *A.flavus* and *Rhizopus* spp. were common in all samples.

DISCUSSION

Seed-borne diseases have been found to affect the growth and productivity of crop plants.^{13,14,15} This must be addressed properly because high seed quality is essential in any crop production venture to attain higher yield and good quality products. In this study significant number of fungi was isolated from these seed

samples. The percentage of external infestation was more in comparison to internal infestation. Even surface disinfestations of these seeds with 0.1% solution of sodium hypochlorite for two minutes did not check infestation completely except that of *Fusarium oxysporum* and *A.alternata*. Many other authors have also proved such infection and its effect on whole plants leading to great economic loss.^{16,17,18} The infestation of fungi *A.niger*, *A.flavus* and *Rhizopus* spp. clearly indicated that the fungi were present deep within the seed.

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