Table 1. Karyological and cultural comparison of *Rhizoctonia* spp.

Character	*Rhizoctonia* sp	*R. solani* (root/collar rot pathogen)	*R. solani* f.sp *sasakii* (sheath blight pathogen)
Nuclei/hyphal cell			
Range	1-6	3-10	3-12
Mode	4	5	7
Mean	3.22	5.22	6.55
Growth rate on PDA: Colony (mm day^{-1})	35.3	33.0	30.0
Virulence test[1] : Seedling mortality percentage	100	81.7	61.7
Sclerotial shape, size, and color	Generally crust like, and rarely round to irregular small (0.5-1.5 mm); light brown; Honeydew absent	Always globose to subglobose, large (104.0 mm); dark brown; Honeydew present.	

1. Virulence was tested at inoculum level of 150 mg mycelium pot^{-1} having 1 kg soil. Inoculum was mixed in upper 2.0 cm of soil before sowing of chickpea variety C 235.

R. solani and *R. solani* f. sp *sasakii*. Attempts to develop the basidial stage of this fungus were not fruitful. However, based on karyological and cultural studies (nuclear range, mean, mode number, growth rate, virulence, and shape, size, and color of sclerotia), it can be differentiated from *R. solani* f.sp *sasakii* (sheath blight pathogen).

Effect of Sowing Date on the Incidence of Botrytis Gray Mold in Chickpea

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Gray mold caused by *Botrytis cinerea* is one of the major yield-limiting factors in chickpea in Nepal. Most of the present day varieties grown by the farmers are susceptible to this disease. Therefore, breeding gray mold resistant varieties is the most economical way to control the disease. In 1984, to identify sources of resistance, screening of germplasms against this pathogen was initiated in Nepal. However, changes in disease reaction of several chickpea lines over seasons and locations have made the breeding for botrytis resistance a difficult task. The level of resistance/tolerance in the identified genotypes is very low, and the chemical control of the disease is not economical. Therefore, the control of the disease through agronomic manipulations was considered as a possible option, and the effect of sowing dates on the incidence of gray mold in chickpea was studied at National Grain Legumes Improvement Programme, Chitwan, Nepal, in 1988/89.

The experiment was conducted in a split-plot design with four replications. Three genotypes [Dhanush, ICCV 1 (Sita), and ICCL 82108] were arranged in main plots, and five sowing dates (10 Oct, 25 Oct, 10 Nov, 25 Nov, and 10 Dec 1988) were utilized in subplots. Each plot had six 4-m rows

spaced at 40 cm, with plants at 10 cm within rows. The experiment was kept free from weeds, and was protected against *Helicoverpa armigera*.

The plants were scored for gray mold incidence on 2 Apr 1989. The central four rows were used for this purpose. Five plants chosen at regular intervals in each row were scored on a 1 to 9 scale (1 = No symptoms of the disease, and 9 = More than 80% leaves and/or flowers infected). The disease intensity for each plot was then calculated by dividing the total of all scores (Σ pi) multiplied by 100, by the cross product of the highest score (ph) in the scale and the total number of plants observed (pn), (Σ pi x 100/ph x np). The data were analyzed after arc-sine transformations. A simple linear correlation was worked out between the disease intensity and the plant height for each genotype.

There were significant differences (P = 0.05) in the disease intensity among the genotypes (Table 1). The genotype Dhanush showed significantly lower disease intensity than the other two genotypes, ICCV 1 (Sita) and ICCL 82108. Similarly, the sowing dates also showed significant differences (P = 0.01) in the disease intensity. Compared to a given sowing date, each subsequent date of sowing reduced the gray mold incidence significantly.

The interaction of genotypes with sowing dates was also found significant at P = 0.05 level. This can be attributed to the variation in the rate of decline in disease incidence among the genotypes with delay in sowing. The genotypes ICCV 1 (Sita) and ICCL 82108 showed similar disease intensity across the sowing dates, as well as over the dates. These genotypes showed an acceptable level of disease resistance only when sown on 25 November and later, while Dhanush showed such an acceptable level when sown 15 days earlier (10 November).

The height of the plants decreased as the sowing

Table 1. Effect of sowing date on the incidence of gray mold in chickpea at Rampur, Chitwan, Nepal, 1988/89 postrainy season.

	Disease intensity (%)					
Genotype	10 October	25 October	10 November	25 November	10 December	Mean
Dhanush	84.88 (68.12)[1]	57.88 (49.60)	49.20 (44.53)	26.53 (31.00)	23.32 (28.83)	48.36 (44.42)
ICCV 1 (Sita)	88.00 (70.22)	78.88 (62.85)	64.84 (53.65)	49.79 (44.89)	33.99 (31.03)	63.10 (52.53)
ICCL 82108	93.63 (77.79)	80.75 (64.35)	61.38 (51.68)	45.33 (41.62)	36.07 (36.84)	63.43 (54.46)
Mean	88.33 (72.04)	72.50 (58.93)	58.47 (49.95)	40.55 (39.17)	31.12 (32.23)	
SE						
Genotypes			(±2.5617)			
Dates			(±1.7557)			
Sowing dates in a genotype			(±3.0411)			
Genotypes at a sowing date			(±4.1066)			
CV (genotypes) % = 16.11; CV (dates) % = 8.50						

1. Arcsine transformed value and SE refer to these.

date was delayed, and was found to be significantly and positively correlated with the disease intensity in all genotypes ($r>0.9$). Therefore, it appears that the increased biomass which is usually associated with plant height at earlier sowing dates might be one of the reasons for higher gray mold incidence.

The study has indicated that late sowing appears to supress botrytis incidence. Therefore, the identification of chickpea genotypes suitable for late-sown conditions will contribute to successful management of gray mold in chickpea in Nepal.

References

Grewal, J.S., and **Laha, S.K.** 1983. Chemical control of Botrytis blight of chickpea. Indian Phytopathology 36:516-520.

Morrall, R.A.A., and **McKenzie, D.L.** 1974. A note on the inadvertent introduction to North America of *Ascochyta rabiei*, a destructive pathogen of chickpea. Plant Disease Reporter 58:342-345.

Field Screening of Chickpea Varieties and Cultures Against Gray Mold (*Botrytis cinerea*) in Bihar, India

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Gray mold caused by *Botrytis cinerea* Pears. ex Fries completely destroyed 20000 ha of chickpea in Mokamah-Barahiya 'Tal' of Bihar during the 1979/80 postrainy season (Grewal et al. 1983). It is imperative to find out resistant varieties suitable for this region. With this view, 54 varieties and cultures were screened in the 1985/86 and the 1986/87 postrainy seasons at Rajendra Agricultural University Farm, Sabour, for resistance to *B. cinerea* under artificial epiphytotic conditions. These were created by giving a light irrigation to the field 24 h prior to inoculation. The crop was spray-inoculated (40000 spores m^{-1}) three times at weekly intervals in the evening, starting from the 1st week of February (flowering time) in both the years. There were differences in the flowering and maturity periods of the different varieties and cultures, but the three inoculations did cover the flowering time of all the entries. Thus, there was the least chance of disease escape. The disease scoring was done on a 1-9 scale (Morrall and McKenzie 1974).

None of the varieties/cultures could be rated as immune or resistant. However, moderately resistant and tolerant varieties and cultures could be found which are given below:

Moderately resistant: BG 236; BG 246; BG 268; BG 276; RSG 1-16; K 850; K 902; and GBS 1.

Tolerant: BG 240; BG 249; BG 279; BG 291; RSG 24; P 919, No. 267; Pusa 209; ICC 28; ICC 1069; ICC 6250; and ICC 8383.

The rest of the varieties and cultures were moderately to highly susceptible.

A Check List of Chickpea Diseases Recorded in Zambia

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Chickpea has been introduced only recently to Zambia. It is mostly grown by a few commercial farmers around urban areas, where there is a demand. At present, diseases are relatively of less importance for the crop. However, the following fungal, viral, mycoplasma, and nematode-caused diseases have been recorded on the crop in Zambia:

A. Fungal diseases

1.	Fusarium wilt	- *Fusarium oxysporum* f.sp *ciceri* (Padwick) Snyd and Hans.
2.	Dry root rot	- *Rhizoctonia bataticola* (Taub) Butl.
3.	Powdery mildew	- *Leveillula taurica* (Lev.) Arnaud
4.	Sclerotium collar rot	- *Sclerotium rolfsii* Sacc.

B. Viral diseases

1.	Stunt	- Pea leaf roll virus
2.	Proliferation	- Cucumber mosaic virus (CMV?)

C. Mycoplasma disease

1.	Phyllody	- Mycoplasma (?)