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Comparative study of hexaconazole 5% against leaf spot of *Vigna mungo* (Linn) black gram with reference to conidial concentration

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ORIGINAL RESEARCH ARTICLE	ABSTRACT
<p>ARTICLE INFORMATION</p> <p><i>Article history</i> Received: 10 December 2013 Revised: 18 December 2013 Accepted: 24 December 2013 Early view: 29 December 2013</p> <p><i>*Author for correspondence</i> E-mail: ganipurkarv@yahoo.com Mobile/ Tel.:</p> <p><i>Keywords:</i> Airspara Black gram <i>Cercospora canescens</i> <i>Fusarium equiseti</i> Hexaconazole.</p>	<p>Objectives: Black gram <i>Vigna mungo</i> (Linn) is a highly prized pulse. It is widely cultivated in many tropical and subtropical regions of the world including India. Cultivation and production of black gram showed decreased trend in last few years mainly due to the incidence of diseases. The effective control of the disease with the application of fungicides is need of hour. The aim of the study was to evaluate Hexaconazole in vivo against leaf spot disease causing fungi on <i>Vigna mungo</i>.</p> <p>Materials and methods: This experiment was conducted to examine the efficacy of Hexaconazole 5% Sc against Leaf spot (fungal disease) on Black gram caused by <i>Cercospora canescens</i>, <i>Fusarium equiseti</i> and <i>Curvularia lunata</i> in Black gram. Hexaconazole 5% Sc was used the concentration i.e. 400 ml/0.40 hectares and the same time airspora trapped by Tilak air sampler. The experiment was carried out during Kharif season-2013 and the experimental side exactly located on 19^o.04945' latitude and 77^o.684476' longitude.</p> <p>Results: The results showed that Hexaconazole 5% Sc was highly effective in controlling the incidence of Leaf spot in Black gram. The spore concentrations of <i>Cercospora</i>, <i>Fusarium</i> and <i>Curvularia</i> were decreases after spraying the Hexaconazole 5% Sc fungicides as compare to untreated black gram field.</p> <p>Conclusions: Present investigation revealed that fungicide Hexaconazole 5% Sc is potent to control the leaf spot diseases on black gram caused by various fungi and enhance grain yield and quality of the seed.</p>

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INTRODUCTION

Black gram *Vigna mungo* (Linn) Hepper synonym *Phaseolus mungo* Linn, non Roxb. and Auct; *Phaseolus radiates* Roxb. is a high prized pulse. It is widely cultivated in many tropical and subtropical regions of the world including India, Iran, Malaysia, East Africa and many southern European countries. The pulse is used in rheumatism, nervous and hepatic disease. The roots of the plants are narcotic and are used for aching bones. The plant prevents soil erosion and conserves soil moisture.

Cultivation and production of black gram showed decreases trend in last few years mainly due to the incidence of diseases. The average yield of black gram is very low due to low inherent yield potential and susceptibility of crop to the disease (Thakur et al., 1977). Leaf spot disease caused by *Cercospora canescence* is a serious disease in the black gram growing areas during the season (Bashir and Jubair, 1985); which is responsible for 23% losses in yield (Quebral and Cagampang, 1970). Maximum loss of 61% was observed in case of grain yield (Iqbal et al., 1995). Several workers had

reported the effective control of the disease with the application of fungicides (Singh and Naik, 1977; Singh and Singh, 1978).

MATERIAL AND METHODS

The experiment was conducted in two different plots in the same location during 05th June to 17th September 2013 (i.e. Kharif season) at 19^o.04945' latitude and 77^o.684476' longitude at Ganipur Tq. Umri Dist. Nanded (M.S.) to evaluate the efficacy of hexaconazole 5% Sc against leaf spot disease in black gram and trap the airspora in same time in the field. The black gram variety (Eagle black seed) selected for the study and sowing was done on 12 June 2013 at a spacing 30 cm and 10 cm between rows and plants respectively.

The airspora trapped through continuous volumetric Tilak Air Sampler was installed in the black gram field at a constant height of 1 M above the ground level in both the fields. Each fields nearly 0.80 hectares of land, completely devoted for the cultivation of black gram was selected as a sampling site. Air sampling was started from 05 June 2013 to 17 September

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2013. The scanning of slides and detailed calculation were obtained by using the method described by Singh (1988). The detailed metrological data of temperature, relative humidity and rainfall was collected from the Cotton Research Station, Nanded, India which is the nearest metrological observatory from the test field.

The first spray was taken up after initial appearance of the disease in the treated crop field and further sprays were done at an interval of 15 days with 'High Tech' sprayer @ 200 lit/0.40 hectare for through coverage of foliage with sprayer fluid. The severities of leaf spot were recorded one day before the every spray standard rating scales during the season in both the fields. Percent Incidence (PI) of the disease was calculated for leaf spot. The yield was recorded from each net plot band computed to yield in 100 Kg/hectare.

Table 1: Efficacy of hexaconazole 5% Sc against leaf spot of urdbean during Kharif season-2013.

Treatment	PI (Percent Incidence) of leaf spot disease during 4 sprays					Yield Kg/0.40 ha
	I st spray (After 25 day)	II nd spray (After 40 day)	III rd spray (After 55 day)	IV th spray (After 70 day)	Mean	
Hexaconazole 5% Sc 400 ml/0.40 ha	9.18	7.89	7.40	8.16	8.15	605
Untreated Plot	9.58	13.81	17.55	24.05	16.24	415

Sc: Super crop; ha: Hectare.

The results obtained in the present study revealed that all the treatments significantly increased the seed yield (605 Kg/0.40 ha) over the untreated control (415 Kg/0.40 ha). The grain yield was the highest from the experimental plots treated with hexaconazole 5% Sc at 400 ml/0.40 ha during the season. The fungicidal treatments not only increased the yield but grain quality was also superior as compared to uncontrolled plot.

The comparative study of leaf spot disease causing fungi showed that the treated field with fungicide hexaconazole 5% Sc reported less number of diseases causing spores as compared to untreated fields (Table 2). Among the pathogenic fungi *Curvularia* total spore concentration was highest followed by *Cercospora* in treated fields. Further results showed that the number of spore is not constant throughout the season (i.e. variation in number). The *Cercospora* recorded monthly maximum concentration 5978/m³ and 7686/m³ of air was recorded in the month of August 2013 over treated and untreated black gram field respectively. The total concentration of *Cercospora* conidia

Table 2. Comparative concentration of leaf spot causing airborne fungal conidia over black gram field.

Spore type	June (26 day)	July	August	Sept (17 day)	Total Spore Conc/m ³ of air
	Spore conc/m ³ of air				
<i>Cercospora</i> (Treated plot)	5026	5782	5978	3528	20314
<i>Cercospora</i> (Untreated plot)	4704	6846	7686	4284	23520
<i>Curvularia</i> (Treated plot)	7462	8960	9856	6118	32396
<i>Curvularia</i> (Untreated plot)	7742	11704	13412	8218	41076
<i>Fusarium</i> (Treated plot)	1218	1680	1568	910	5376
<i>Fusarium</i> (Untreated plot)	1064	1946	2338	1442	6790

The spore concentration of *Fusarium* was 1218/m³ & 1064/m³, 1680/m³ & 1946/m³, 1568/m³ & 2338/m³ and

RESULT

During the experimental period the data regarding the incidence of leaf spot was presented (Table 1). The results showed that the fungicides, hexaconazole 5% Sc at the concentration 400 ml/0.40 ha was found effective against leaf spot. The Percent Incidence (PI) of the leaf spot was nearly constant during the season in treated plot, since the incidence of leaf spot was very rare in the treatment compared with untreated control. Severe incidence of leaf spot was observed in untreated control plots during the season. Hence, it was evident that hexaconazole 5% Sc was highly effective in controlling the incidence of leaf spot in black gram.

20314/m³ and 23520/m³ of air over treated and untreated plot of black gram fields respectively. During this investigation the *Cercospora canescens* causes leaf spot which was found on both the fields but their maximum disease incidence on untreated field of black gram field.

Among pathogenic fungi *Curvularia* causing the leaf spot (*C. lunata* (Wakker) Boed IMI No. 3519080) was found to be the most dominant form and represented 32396 spores/m³ and 41076/m³ of air over treated and untreated field respectively, with an average incidence of 308.53 spores/m³/day and 391.2 spores/m³/day of air respectively treated and untreated fields. The occurrence of its spores in the air was recorded almost in all the days throughout the period of study. Its spore concentration in the air over the treated crop was a low as 84 spore/m³/day in the first week when the first *Curvularia* spores were trapped. However, there was an increasing frequency occurrence concurrently with the disease incidence day to day variation during the season.

910/m³ & 1442/m³ of air in the month of June, July, August and September over treated and untreated black gram field

respectively. The total concentration of *Fusarium* spores 5376/m³ and 6790/m³ of air over treated and untreated field respectively.

DISCUSSION

The test compound, hexaconazole 5% Sc was proved effective against leaf spot diseases. The efficacy of hexaconazole against foliar fungal diseases in different crops was well documented. Dadke (1996) reported that hexaconazole (0.05%) was effective in controlling the rust in soybean among various fungicides. Similarly, Patil and Anahosur (1998) reported that hexaconazole at 0.1% sprayed at 15 days interval starting from the onset of disease was found effective in reducing severity of soybean rust with significant increase in seed yield. Nagaraja and Naik (1998) reported the efficacy of triazoles such as propiconazole, penconazole and difenconazole against powdery mildew of pea. Similarly, Khunti et al., (2002) observed that penconazole and hexaconazole effectively minimized the disease intensity of powdery mildew and increased the yield to considerable extent in green gram.

The spore concentration of *Cercospora* nearly constant during the season over treated field and it increasingly trend over untreated field. During this investigation the *Cercospora canescence* causes leaf spot on black gram crop. *Cercospora* leaf spot is a devastating disease that causes qualitative and quantitative losses to the crop (Sivprakasam, 1983). The *Cercospora* leaf spot disease well-defined spots often bound by veins and purplish border develop, the centres of which may turn grey, it appearing about 5-6 weeks after planting, depending upon the weather condition mostly temperature and humidity. It also caused premature defoliation and reduction in size of pods and grains (Grewal et al., 1980).

Curvularia lunata (Wakker) was isolated from the infected leaves and pods of black gram. The spotting is mostly confined to leaf blades; occasionally it occurs on the pods and floral parts. It might be due to the availability of infected test crop, dead and decaying materials and favourable weather condition. However, continuous rain affected the incidence of *Curvularia* spores in the air Mallaiah and Rao (1980). The presence of *Fusarium* spores in air over test field might be due to the prevalence leaf spot and top necrosis disease in untreated fields. *Fusarium equiseti* caused the leaf spot and top necrosis on black gram crops in untreated field. The incidences of disease occur after 4-5 weeks from the date of sowing.

CONCLUSION

Present investigation revealed that fungicide hexaconazole 5% Sc is potent to control the leaf spot diseases on black gram caused by various fungi and enhance grain yield and quality of the seed.

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