

ASSESSMENT OF YIELD LOSS DUE TO NIGER (*GUIZOTIA ABYSSINICA* (L.F.) CASS.) LEAF SPOT CAUSED BY *ALTERNARIA ALTERNATA* (FR.) KEISSL

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ABSTRACT

Loss in niger(*Guizotiaabyssinica* (L.f.) Cass.) caused by *Alternaria* leaf spot disease *Alternaria alternata* (Fr.) Keissl., is a major concern of niger growers. Leaf spot is considered a most injurious disease of niger in south Gujarat, resulting in severe loss especially to susceptible niger cultivars. The disease became epidemic during rainy season, caused heavy loss in grain yield. The avoidable loss of grain yield was estimated to be 34.27 % due to leaf spot disease. With the proper protection measures, 71.40 per cent leaf spot disease can be controlled. Niger crop can be protected from leaf spot disease by giving the seed treatment with mixed formulation of carbendazim (12 %) + mancozeb(63 %) (Saaf 75 % WP) @ 2.5 g/kg seeds and two sprays of Saaf 75 WP @ 0.2 %, 1st at appearance of the disease and 2nd at 15 days after 1st spray.

INTRODUCTION

Niger (*Guizotia abyssinica* (L.f.) Cass., Family : Compositae) is a minor oilseed crop. It is commonly known as *ramtil*, *jagni* or *jatangi* (Hindi); *ramtal* or *kharsani* (Gujarati); *karale* or *khurasani* (Marathi); *uhechellu* (Kannada); *payellu* (Tamil); *verrinuvvulu* (Telugu); *alashi* (Oriya); *sarguja* (Bengali); *ramtil* (Punjabi) and *sorguja* (Assamese) in different parts of the country (Ranganatha, 2013).

The major niger growing countries of the world are Ethiopia and India (Pulate *et al.*, 2013). Niger is largely found in the Ethiopian highlands, particularly west of Rift Valley in Africa. It is also found in some other countries like Sudan, Uganda, Zaire, Tanzania, Malawi, Zimbabwe, West Indies, Nepal, Bangladesh, Bhutan and India. Niger is grown over an area of 300.80 thousand hectares with an average production of 98.90 thousand tones in India. The productivity of niger is low, around 329 kg ha⁻¹ in India. The niger growing states in India are Madhya Pradesh (38.77 %), Chhattisgarh (23.96 %), Odisha (17.20 %), Maharashtra (13.96 %), Karnataka (6.91 %), Bihar (6.34 %), Andhra Pradesh (2.86 %) and West Bengal (0.02 %). However, important states contributing to the total production of the country are Odisha (40.46 %), Madhya Pradesh (21.09 %), Maharashtra (9.55 %), Jharkhand (16.49 %), Andhra Pradesh (3.82 %), Karnataka (4.43 %) and West Bengal (4.16 %) (Dhadge *et al.*, 2004). In Gujarat, niger is cultivated on 7 thousand hectares of area with production of 2 thousand tonnes with productivity of 286 kg ha⁻¹

(Ranganatha, 2013). The south Gujarat heavy rainfall zone particularly comprising of Dang, Navsari and Valsad districts are very potential areas where niger is grown to some extent. (Jagtap *et al.*, 2014). The oil extracted from niger seed is used for human food such as in frying vegetables, meat and other cereal products. Besides cookery, it is used for lighting, anointing, painting and cleaning of machinery.

During survey niger was found to be suffered from leaf spot disease caused by *Alternaria alternata* and causing serious yield losses in niger. *Cercospora* leaf spot (*Cercospora* sp.) and *Alternaria* leaf blight (*Alternaria* sp.) disease causing heavy damage to niger crop and reduce its seed yields which harms the status of the farmers (Sandipan *et al.*, 2014a). The accidental rain at flowering stage leads the expansion of the leaf spot incidence and results in the poor seed set and seed yield (Sandipan *et al.*, 2014b). Niger, a little cared eco friendly oilseed crop, is a life line of tribal agriculture and economy of India, so there is a need of further study on loss assessment to create more scientific information on control measures. Hence, the present investigation on loss assessment due to *Alternaria* leaf spot of niger was undertaken.

MATERIALS AND METHODS

The trial for loss assessment due to leaf spot disease of niger was carried out at Niger Research Station, N.A.U., Vanarasi during 2013. Susceptible (GN 1) variety of niger was grown in

Table 1: Loss due to leaf spot disease (*Alternaria alternata*) in niger.

	Protected Plot	Unprotected Plot	Two sample t value	Result	% Loss in yield	% Disease control
Per cent disease intensity	10.60%	37.07%	16.79	**		
Yield	419.9 kg/ha	276kg/ha	6.8	**	34.27%	71.40%

** Highly significant

two separate plots each of 20 m x 10 m for the study. Ten sites per plot were formed of 8.40 m x 1.65 m size. The crop was sown on 12th July, 2013 and harvested on 25th October, 2013. Recommended management measures were taken in one plottreated as protected plot while the plot in which no any control measure was applied was treated as unprotected plot. There commended agronomical practices were adopted area forboth the plots.

Protected plot

Seed treatment with mixed formulation of carbendazim (12 %) + mancozeb (63 %) (Saaf 75 % WP) @ 2.5 g/kg seeds and two sprays of Saaf 75 WP @ 0.2 % (1st at appearance of disease and 2nd at 15 days after 1st spray) was applied to keep the plot free from the disease infection.

Unprotected plot

Seed treatment and spraying of fungicides was not done. This plot was kept unsprayed and served as control.

Both the plots were periodically observed for initiation and development of the disease. The observations on leaf spot intensity was recorded. For recording the observations on leaf spot of niger, ten plants from each of the 8.40 m x 1.65 m size site were selected for the observations on leaf spot. Three leaves each from lower, middle and upper portion were observed for leaf spot intensity. The disease rating was recorded by adopting 0 – 5 grade scale where, 0 = no disease, 1 = 1 to 10 % leaf area infected, 2 = 11 to 25 % leaf area infected, 3 = 26 to 50 % leaf area infected, 4 = 51 to 70 % leaf area infected, 5 = 71 to 100 % leaf area infected (Duhoon, 2002). The data were statistically analyzed by applying two sample t-test and presented in Table – 1. The grain yield per site was also recorded and this was converted per hectare. The loss of grain yield due to leaf spot was calculated on the basis of following formula (Nagaraja *et al.*, 2007).

$$\text{Yield loss} = \frac{T_t - T_c}{T_t} \times 100$$

Where

T_t = Yield in treated site (kg/ha)

T_c = Yield in control site (kg/ha)

RESULTS AND DISCUSSION

The loss in niger seed yield due to leaf spot caused by *A. alternata* was assessed during the year 2013 at Niger Research Station, N.A.U., Vanarasi (Vansda). The results presented in Table 1 indicated that average mean grain yield of niger in protected plot was 419.90 kg/ha, while in unprotected plot, it was 276.00 kg/ha. Thus, the loss in grain yield occurred due

to the leaf spot disease was 34.27 per cent.

In protected plot, 10.60 per cent average mean leaf spot intensity was recorded as against 37.07 per cent in unprotected plot. Thus, 71.40 per cent disease was controlled by protecting the crop with giving the seed treatment with saaf 75 WP @ 2.5 g/kg seeds and two sprays of the same @ 0.2 %, 1st at appearance of the disease and 2nd at 15 days after 1st spray. The present findings suggested that the pathogen is devastating in nature and cause substantial yield loss in

susceptible variety of niger in south Gujarat which can be avoided by adopting effective control measures. Shukla and Singh (1973) reported that considerable losses have been observed due to the diseases caused by seed borne pathogens in niger crop. Nagaraja and Krishnappa (2009) reported that seed borne mycoflora of niger played an important role in determining the quality and longevity of seeds. Microbial invasion can lead to the rotting and loss of seed viability, vigour, germination and oil quality. Sandipan *et al.* (2014) stated that *Cercospora* and *Alternaria* diseases of niger caused heavy damage to niger crop and reduced its seed yield. Jagtap *et al.* (2014) observed *Alternaria* leaf blight (*Alternaria* sp.) and *Cercospora* leaf spot (*Cercospora* sp.) as the important diseases causing significant yield reduction in niger. This is the first report on loss assessment in niger due to the leaf spot in Gujarat.

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