

Seasonal Incidence of Shoot fly *Atherigona soccata* (Rondani) on Minor Millets in Relation to Weather Parameters

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ABSTRACT

A field experiment was conducted at Agricultural College, Naira during *rabi*, 2021-22 to assess the seasonal incidence of insect pest shoot fly of minor millets and its correlation with weather parameters. The incidence of shoot fly (*Atherigona soccata*) started during 6th standard meteorological week (SMW) with peak level of incidence at 8th-9th SMW in finger millet, proso millet, little millet and pearl millet crops, respectively. Among the weather parameters minimum temperature ($r = -0.482$, $r = -0.502$, $r = -0.513$) in finger, proso and little millets and also in evening relative humidity ($r = -0.466$, $r = -0.476$) in proso and little millets showed significant negative correlation. Whereas all the other weather parameters, had a non significant correlation. There was no rainfall recorded during the crop grown period.

Keywords: *Pest incidence, correlation, maximum and minimum temperatures, relative humidity, millets and Shoot fly.*

A number of different small grained cereals are collectively described as 'Millets'. Millets are cultivated as grain crops in Africa and Asia and belong to the family Poaceae, primarily grown on marginal lands in dry areas of subtropical and tropical regions (Tonapi *et al.*, 2013). Small millets have traditionally been main components of food basket of poor people in India. Small millets namely, finger millet (*Eleusine coracana*), little millet (*Panicum sumatrense*), barnyard millet (*Echinochloa frumentacea*), foxtail millet (*Setaria italica*), proso millet (*Panicum miliaceum*) and kodo millet (*Paspalum scrobiculatum*) are valued for their varied nutritional and health benefits (Chandrasekara and Shahidi, 2011; Trusswell, 2002; Gupta *et al.*, 2012; Saleh *et al.*, 2013). These crops can be grown for fodder/straw purpose in intercropping system (Choi *et al.*, 1985). Millets are totally pest free and require low quantity

of pesticides according to traditional growing techniques. Millets can grow under very low rainfall regimes of 200mm and 500 mm (Millet Network of India, 2020). Worldwide, at least 150 insect species have been recorded on millets. Of which, 116 species have been recorded from India. Most of the pests are common to all species of millet. Insect feeding on different plant parts at various plant growth stages results in economic losses due to decrease in crop productivity and grain quality, and decreased fodder yield. Shoot fly is a major pest in millet crops, laying eggs singly on the underside of leaves. The larvae migrate to the growth point after hatching and cut the central leaf, resulting in the formation of a dead heart. Infestation usually occurs between 1-4 weeks after seedling emergence. However, under heavy shoot fly pressure, the tillers are also attacked. (Arun Kumar and Channaveerswami, 2015).

MATERIAL AND METHODS

In order to evaluate the incidence of major insect pest shoot fly in minor millets with relevance to change in abiotic factors, a field experiment was conducted at Agricultural College Farm, Naira during *rabi*, 2021. The varieties VR-847, TNAU-202, DHLM 36-3, Dhanshakthi of finger, proso, little and pearl millet crops, respectively were sown in Agricultural college, Naira during *rabi*, 2022 with a row to row and plant to plant distance of 30 cm and 10 cm, respectively. The pest incidence in terms of shoot fly count was recorded from 10 randomly selected plants at five days interval. Data regarding abiotic factors such as rainfall, maximum and minimum temperatures, and relative humidity were recorded from the meteorological observatory at Agricultural College Farm, Naira to study the relationship with the shoot fly incidence on minor millets. A simple correlation was also worked out between the mean pest population dead hearts due to shoot fly and weather parameters was carried out.

RESULTS AND DISCUSSION

Shoot fly infestation in different millet crops:

On perusal of the data collected on seasonal incidence of insect pests, it was noticed that among the millet crops shoot fly incidence was observed in finger millet, proso millet, little millet and pearl millet.

The peak incidence of shoot fly incidence (Table 1) was observed during 8, 9th SMW of the year, with plant infestation of 12.11%, 16.67%, 12.89% and 11.67% in finger, proso, little and pearl millet crops, respectively. at 32.6 °C maximum temperature and 20.8 °C minimum temperature, the average morning and evening RH were 82.6 and 51.6 per cent

Correlation matrix (Table 2) in finger millet indicated a non significant negative correlation with maximum temperature ($r = -0.346$) and morning RH,

evening RH ($r = 0.384$, $r = 0.405$) showed a non significant positive correlation whereas minimum temperature ($r = -0.482$) showed significant negative correlation and in proso millet correlation matrix (Table 2) indicated a significant negative correlation with minimum temperature, evening RH ($r = -0.502$, $r = -0.466$) and maximum temperature ($r = -0.305$) showed a non significant negative correlation whereas morning RH ($r = 0.272$) showed a non significant positive influence. Correlation matrix (Table 2) indicated significant negative correlation with minimum temperature, evening RH ($r = -0.513$, $r = -0.476$) and non significant negative correlation with maximum temperature ($r = -0.307$) and non significant positive influence with morning RH ($r = 0.298$) in little millet and in pearl millet correlation matrix (Table 2) indicated a non significant negative correlation with maximum temperature, minimum temperature, evening RH ($r = -0.282$, $r = -0.429$, $r = -0.412$) whereas morning RH ($r = 0.349$) showed a non significant positive correlation.

The present findings are closely related to Satish *et al.* (2017) who worked on incidence of shoot fly in proso millet and reported that shoot fly incidence had direct significant and negative association with the relative humidity. The present findings are also in part conformity with that of Pavana Kumar *et al.* (2015), who reported that the relative humidity had negative correlation with shoot fly incidence in proso millet. The findings of the present study is in close conformity with that of Raghvani *et al.* (2008) who reported that the, shoot fly infestation in pearl millet ranged from 6.4 -13.2 per cent during 15 to 56 days after germination. Dead heart per cent due to shoot fly was maximum during *kharif* 2001 and none of the weather parameter showed significant correlation with incidence of shoot fly. Choudhary *et al.* (2018) reported that the effect of abiotic factors on shoot fly had a non significant negative correlation

Table1. Influence of abiotic factors on shoot fly (*A. soccata*) in millet crops during rabi, 2021-22

SMW	Mean Temperature (°C)		Mean relative humidity (%)		Shoot fly incidence (%)			
	Max.	Min.	Morning	Evening	Proso millet	Little millet	Finger millet	Pearl millet
4 th ,5 th	29.80	18.00	77.80	52.80	0.0	0.0	0.0	0.0
5 th	31.10	16.80	84.60	53.80	0.0	0.0	0.0	0.0
6 th	31.30	18.20	77.40	53.00	3.33	3.24	3.22	1.22
6 th ,7 th	30.90	18.40	74.40	61.60	6.67	5.86	3.56	3.22
7 th	32.00	17.30	80.60	46.00	7.45	7.45	7.56	7.12
8 th	33.20	22.40	85.40	56.20	10.00	10.66	10.33	10.33
8 th ,9 th	32.60	20.80	82.60	51.60	16.67	12.89	12.11	11.67
9 th ,10 th	35.40	19.60	77.40	44.80	10.45	10.45	7.56	10.22
10 th	36.00	22.40	79.80	44.00	7.45	7.12	5.11	4.11
10 th ,11 th	37.00	19.80	73.40	37.00	6.67	5.45	3.22	3.44
11 th ,12 th	35.80	23.00	81.20	47.00	3.20	3.22	2.27	1.44
12 th	35.40	25.00	81.80	61.80	0.0	0.0	0.0	0.0

Table 2. Simple correlation between abiotic factors and shoot fly in different millet crops

Weather parameters	Percent Infestation of shoot fly			
	Finger millet	Proso millet	Little millet	Pearl millet
Maximum temperature (°C)	-0.346	-0.305	-0.307	-0.282
Minimum temperature (°C)	-0.482*	-0.502*	-0.513*	-0.429
Morning relative humidity (%)	0.384	0.272	0.298	0.349
Evening relative humidity (%)	0.405	-0.466*	-0.476*	-0.412

* Significant at 5% level

with maximum and minimum temperature, total rainfall and sunshine hours. However, non significant positive correlation existed with average RH during 2014. During 2015, it had a non significant negative correlation with maximum temperature, total rainfall and sunshine hours and non significant positive correlation with minimum temperature and average relative humidity (RH) in pearl millet.

CONCLUSION

As per the field studies regarding the seasonal incidence, the occurrence of dead hearts by shoot fly during 6th week after sowing (6th standard week) with peak level of incidence at 8th-9th standard week (12.11, 16.67, 12.89, 11.67 per cent dead heart) in finger, proso, little and pearl millet crops, respectively. Among the weather parameters minimum temperature ($r = -0.482$, $r = -0.502$, $r = -0.513$) in finger, proso and little millet crops and also in evening relative

humidity ($r = -0.466$, $r = -0.476$) in proso and little millet showed significant negative correlation. Whereas all the other weather parameters including rainfall had a non significant correlation.

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