Population dynamics of Niger(*Guizotiaabyssinica* L. f. Cass) majorpests

Is it one species of insect or many species. From the key words, it would appear, it concerns many species. Please,look at it properly

Abstract

An experimentwas conducted at PC Unit, Sesame & Niger, JNKVV, Jabalpur, Madhya Pradesh during Pre-*rabi* season 2020-2021.Theexperiment was laid out in an area of **20×10m² area with 10cm plant to plant and 40cm row to row spacing** using the Niger variety JNC-6.Correlations between meteorological parameters and population of whitefly showed that mini- temp.(r= -0.681),morning relative humidity (r= -0.607),bothmorningvapour pr.(r= -0.642) and evening (r= -0.626) had significant but negative impact on the incidence of whitefly'spopulation. The other weather variableswerenon-significant.Correlations between meteorological parameters and population of *Nezara* bug showed that maxi-temp.(r= -0.756) and evaporation (r=-0.791) had significantandnegative impact on the incidence of *Nezara* bug. The other weather parameters had non-significant impact on the incidence of stink bug.Correlations between incidence of capsule fly and sunshine hours (r =-787) and incidence of capsule fly and wind speed (r =0.826) were significant and negative and significant and positive respectively. Correlations with other weather parametersand incidence of capsule fly were non-significant.

Keywords: Population dynamics, Capsule fly, *Nezara* bug, Whitefly, Leafhopper, Stink bug, Niger.

1. Introduction

Niger (*Guizotiaabyssinica* L.f.Cass) is an essential minor oilseed crop of India and grows mainly in hilly and tribal areas. It is nutritious in terms of its 38 to 42% of quality oil with 18 to 20% protein in the seed. It is the lifeline of tribal agriculture and Indianeconomy (Panday*et al.*, 2014)[6](either you use the Panday*et al.*,2014 or numbers[6] in references. Which one does the Journal accepts ?). Though originated from Tropical Africa,it is widely spread and extensively cultivated in India since time immemorial and commonly known as Ramtil in India and Noog in Ethopia. In India, Niger crop is cultivated mainly in the states of MP, Orissa, MT, Hilly area of JH, BR,

Chhattisgarh, KT, AP and to some extent in the hilly areas of RJ, GJ and TN. India ranks first in terms of cultivatedmassland, production and exportation of Niger in the world. Niger is planted in an area of roughly112.8 thousand hectares in India, with a production of 40.3 thousand tons and an average productivity of 357.2 kg per hectare. Madhya Pradesh donates roughly 16.0 thousand hectares of land, with an annual yield of 4.9 thousand tons and an average productivity of 308.8 kg per hectare (Anonymous, 2021-22)[1].Insect pests, diseases and weeds are serious threats to Niger crop production (Srivastava *et al.*, 1995)[8]. One of the constraints in the production of Nigercrop is the colossal damages caused by various insect pests under some agricultural systems. The Niger crop isaffected bysome prominent agricultural pests , namely*Condicaconducta*, *Spilosoma oblique*, (give full name of*U.carthami*), *Dioxynasororcula*,(full name of*B.tabaci*),*Taylorilyguspallidulus* and leaf hopper(reference).The aim of this work was to study the population dynamicsof these crop pests in????????? area ?

2. Materials and methods

The experiment was laid out in 20×10m² area with 10cm plant to plant and 40cm row to row spacing, using the Niger variety JNC-6. For population dynamic studies of major insect pests, observations were recorded each week on five plants from ten randomly selected spot, start from first week after germination and continued till maturity of the crop. The observations of whitefly (adults) and leaf hopper (nymphs and adults) were recorded on six leaves per plant *viz.*, each from top, middle and bottom (lower leaves). The population of caterpillars on Niger was recorded by counting the number of larvae per plant while the population of capsule fly was recorded by counting the number of adults per plant. The population of green stink bug was recorded by counting the number of nymphs and adults per plant.

3. Results and discussion

The incidence of whitefly (0.26 whitefly/three leaves) was recorded from 40th standard week (vegetative stage) and continued till 50th standard week (maturity of the crop). The population of whitefly was gradually increasing from 40th standard week, (0.26 whitefly/three leaves) with a peak (2.23 whitefly/three leaves) during 47th standard week, when maximum and minimum temperatures were 28 and 10.7˚C,

respectively, with 82 percent morning and 37 percent evening relative humidity and 1.4 mm of rainfall. The population of whitefly showed significant butnegative correlations with minimum temperature (r= -0.681), relative humidity morning (r= -0.607) vapour pressure morning (r= -0.642) and evening (r= -0.626). The population of whitefly showed non-significantbut negative correlations with maximum temperature (r= -0.4499), relative humidity evening (r= -0.567), evaporation (r= -0.249) while its population showed non-significant butpositive correlation with sunshine hours (r= 0.326), rainfall (r= 0.111), wind speed (r= 0.395) and rainy days (r= 0.056). The incidence of leafhopper was observed from 40th standard week with 0.24 leafhopper/three leaves and continued till 49thstandard week with 0.14 leafhopper/three leaves. The peak period for the incidence of leafhopper (r= 1.36 leafhopper/three leaves) was observed during 46th standard week when maximum and minimum temperatures were 31.2˚C and 15.5˚C, respectively, with 86% and 41% morning and evening relative humidity and 5.2mm rainfall. The incidence of *Nezaraviridula*was noticed from 43th standard week with 0.20 bug/plant and continued till 49th standard week with 0.54 bug/plant. The peak period (1.02 bug/plant) for the activity of *Nezara*bug was recorded in 48th standard week when maximum and minimum temperatures were 27.6˚C and 9.1˚C, respectively, with 83% morning and 33% evening relative humidity butthere were no rainfall records during that period.

The incidence of capsule fly was reported from flower bud initiation stage(43rdstandard week) with 0.96 fly/plant and continued till maturity stage of the plant growth(49th standard week). The population of capsule fly (0.96 fly/plant) was gradually increasing from 43rd standard week and reached the peak (2.32 fly/plant) during 47th standard week when maximum and minimum temperatures were 28˚C and 10.7˚C respectively, with 82% morning and 37% evening relative humidity and 1.4mm rainfall. The larvae of this insect pest were observed to defoliate the plants. The incidence of these insect pests was noticed fromthe 44th standard week (4th week of Oct.) with 0.26 larvae/plant and continued tillthe 49th standard week (1st week of Dec.) with 0.16 larvae /plant. The population of Niger caterpillar was gradually increasing from the44th standard week to reachthe peak (0.55 larvae/plant) during the 46th standard week (2nd week of Nov.) when maximum and minimum temperatures were 31.2˚C and 15.5˚C, respectively, with 86% morning and 41% evening relative humidity and 5.2mm rainfall were recorded. Present findings are also supported by

the work ofChaukikar*et al.*, (2016)[3]?whoalso studied thepopulation dynamics of insect pests of Niger and reported that the population of *Bemisiatabaci*showed non-significantbut positive correlations with maximum temperature, sunshine, morning relative humidity and evaporation. Present findings are supported by thoseof Prasad *et al.*, (2008)[7]?.These latter researchers reported that the incidence of leaf hopper was observed in the months of August-September. Findings of Darandale(2015)[4]?are partially supportingresults from this study sincethey reported that the incidence of leaf hopper started from the fourth week of sowing i.e. second week of Dec. (0.27 jassid/leaf). Present findings are in agreement with those byPanday*et al.*, (2019)[5]? sincethey reported that caterpillars in Nigerwere at peak during 43rd standard week. Incidence of caterpillars in Niger showed significant but positive correlations with minimum temperature (r= 0.80) and sunshine hours (r= 0.75).

Path analysis revealed that morning relative humidity and rainfall had high direct negative effect on the incidence of caterpillars in Niger. The incidence of this insect pest was noticed fromthe 44th standard week (0.26 larvae/plant) and continued till the49th standard week (0.16 larvae /plant). The peak period for the incidence of Niger caterpillar (0.55 larvae/plan) was recorded duringthe 46th standard week (2nd week of Nov.) when maximum and minimum temperatures were 31.2˚C and 15.5˚C, respectively, with 86% morning and 41% evening relative humidity and 5.2 mm rainfall were recorded. Present resultsare supported by the findings of Basappa*et al.*, (2000)[2]?.The latter reported that the Niger's caterpillar was found feeding on the crop from seedling stage till harvest with the peaks of population of 4.6,3.5,12.03 and 2.13, larvae/plant respectively during vegetative stage (Sept. 3rd week to October 1st week).

4. Conclusion

Minimum temperature (-0.681), relative humidity morning (-0.607) vapour pressure morning (-0.642) and evening (-0.626) had significantbutnegative impact on the incidence of whitefly. The other weather variables had non-significant impact on the incidence of whitefly.In case of population of Nezara bug, it was noticedthat maximum temperature (-0.756) and evaporation (-0.791) had significantbut negative impact on the incidence of Nezara bug. The other weather variables had non-significant impact on the incidence of stink bug. While correlations showed that the sunshine hours (-0.787) had significantbut negative correlation while wind speed

(0.826) had significantbut positive correlation with the incidence of capsule fly. The other weathervariables had non-significant impacts on the incidence of capsule fly

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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