Short Research Article

POPULATION DYNAMICS OF MAJOR INSECT PEST ASSOCIATED WITH KARANJA BASED AGROFORESTRY SYSTEM

ABSTRACT

The field experiment was conducted at New Dusty Acre Area Research Farm, Department of Forestry, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.). Forty provenances planted from different location of 5 x 5 m spacing with having 9 plants in block total number of 120 in randomized block design in between Karanja provenances. Soybean variety was sown for pest association and population dynamics and succession studies. Study found that

There were two insect pest namely miner leaf (Liriomyzatrifolii) and white fly (Bemissiatabaci) And girdle beetle (Obereopsisbravis.) were found infesting the karanja trees well as soybean crop in Madhya Pradesh. Incidence of cow bug was started from first week of July and continue up to last of September with it peak population in middle of august at temperature minimum maximum relative humidity and rainfall were 23.5 c, 31.5,c and 75%, 88% 122mm respectively .The incidence of stem fly was started from second week of august and continue up to last week of October and its higher population was synchronized with adequate number of leaf of tree .The correlation studies reveals a significant and positive correlation and did not differ significant between the insect population of white fly , girdle beetle and bark cater pillar . Whereas correlation was not found non significant between population of Jassid .stem fly girdle, and bark eating caterpillar with average relative humidity.

Keywords- Population dynamics, insect pest, Leaf miner, Whit fly and Stem fly

INTRODUCTION

Insect pests are the most important group of organisms causing injury to plants in agroforestry systems. Therefore, the management of insect pests in these systems is crucial to sustained production and even farmers have recognized this as a priority issue for agroforestry research. Insect pest problems of karanja in agroforestry system are likely to arise from two sources: Those problems associated with the importation of wild plants into

intensively managed ecosystems and those related to some peculiar features of agroforestry. These problems become more prominent if the imported woody plants are taxonomically related to the food or commercial crops of a recipient country. , the insect pest complex of the leguminous genus is Acacia, with emphasis on Acacia mollissimamearnsii is briefly reviewed to illustrate the potential insect pest problems to the exotic plants them selves and how, as companion crops, the exotic plants may compound the pest problems of food legume crops. There is presently a contention that agricultural insect pest management strategies of karanja are deflectable in agroforestry systems.

Karanja (Pongomia pinnata L.) belongs to family Fabacae (Papilionaceae). It is originated from India in naturalized in various humid and sub tropical region of Asia. It is a medium size evergreen tree with a spreading crown and a short bole. The tree is planted for shade growing as ornamental tree. It is one of the few nitrogen fixing trees producing seeds containing 30-40% oil. The natural distribution is along costs and river bank. It can be planted on degraded land, farmer's field boundaries, wasteland, fallow land. Pongamia thrives in area having an annual rainfall ranging from 500 to 2500 mm. It can grow on most soil type ranging from stony sandy to clayey. It does not do well on dry sands. It is highly tolerant of salinity. Highest growth rates are observed on well drained soil with assured moisture.

Bio fuels are relevant to India especially in view of energy, being an important element in poverty alleviation and improvement in quality of life for rural people. Besides it can greatly mitigate the country's staggering oil import bill of Rs.90, 000 crore and provide decentralized energy supply for agriculture, industry and household sectors in rural areas. In recent time’s bio-diesel as alternative source of energy is getting more acceptance and government support. Production of bio-diesel sector would also create huge employment. India's 30 million hectares of wasteland development for bio-diesel production in estimated to generate 15 million jobs. This is part from the jobs created in collection of seeds, marketing and processing. Production of bio-diesel will also create jobs for highly trained manpower in chemical, agricultural and industrial sectors.

MATERIAL AND METHODS

The field experiment was conducted at New Dusty Acre Area Research Farm, Department of Forestry, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.). Forty provenances planted from different location of 5 x 5 m spacing with having 9 plants in block total number of 120 in randomized block design in between Karanja provenances. Soybean variety was sown for pest association and population dynamics and succession studies. Observation for seasonal incidence was taken once in a week whereas population dynamics observation was recorded twice in a week. Randomized Complete Block Design was used for study. To note the succession and incidence of insect pest on Karanja the observation were recorded at weekly interval in the field conditions starting from the first week of August at different stage of plant/crop growth upto 4th week of November on the five randomly selected plants. On the incidence of various insect pest and their natural enemies. The nature of damage of major pest was also studied. The meteorological data of corresponding period of observation was also noted. The studies on correlation coefficient with weather parameters, were also conducted by using the formula:

Where,

rxy = simple correlation coefficient

x = meteorological parameter

y = incidence of insect pest and

n = number of observation

Distribution of insect pest.

To know the distribution and infestation level of various insect pest in Jabalpur (Dusty acre farm under Department of Forestry, JNKVV, Jabalpur, M.P.) 10 provenance of Karanja were surveyed at fortnightly interval and the observation were noted on the incidence of major insect pest on 4 randomly selected plant per locality. Five randomly selected branches in each plant were observed for major pest i.e. moth/caterpillar. Both healthy as well as infested branches were counted and per cent infestation was worked out. The population of insect pest miner leaf, girdle beetle, white fly, ant, stem fly, aphid was also noted.

RESULTS

Forty provenances were tested during the study. All India coordinated project categorized the provenances in to different insect pest group on karanja and soybean. Firstly, the provenances were tested for significance of variance on the basis of critical difference (CD)

at 5 percent Level significance and then categorized in to insect pest resistant or susceptible group.

Table No. 1- Seasonal incidence and population dynamic of insect pest in karanja during 2010

S.No.	Common Name	Scientific Name	Order	Family
1	Leaf miner	LiriomyzatrifoliBugess	Diptera	Agromyzicdae
2	Whit fly	Bemissiatabaci Genn	Hemiptera	Aleurodae
3	Stem fly	MelanagromyzasojaeZehntner	Lepidoptera	Noctiudae

Leaf Miner (LiriomyzatrifaliiBugers)

Leaf miner appeared on the tree on 27th July. Its maggot was found damaging the tree by making whitish zig-zag tunnels between the epidermal layers of leaf which could be seen by holding the leaf against bright light. The pest appeared in the last week of July and continues till second week of September. The maximum and minimum populations of insect were recorded in treatment No. T17 (8.85) and T26 (3.32%) and maximum (52.83%) with minimum (41.64) infestation percentage were recorded in the middle of Octobers when the maximum and minimum temperature was 33.2 and 24.8 oC with maximum 86% and minimum (71%) relative humidly and zero rainfall. Among the 40 provenance susceptible was T17 and lowest susceptible was T26.

White fly (Bemissiatabaci Genn.)

White fly was recorded to seek the cell sap from the lower of leaves and spread leaf curl disease virus. It appeared during the third week of August and remained active until the crop was harvested. The maximum and minimum population was recorded in T9 (217.27/tree) and T40 (77.67/tree). Among the forty provenances highest susceptible was T9 and lowest was T40 whereas remaining provenance was found to have moderate susceptible against white fly. When the maximum and minimum temperature was 33.3 and 23.3 0C and maximum and minimum relative humidity 85% and 64% with zero rainfall.

Stem fly (Melonagromyzasojaezehtner)

Stem fly was observed to such of outer layer of branch or stem of tree from lower surface to higher branch and spread of damage to leaf and other parts of the tree. It appeared during

the fourth week of September and remained active at last of November. The differences in population among the provinance were statistically significant. The provenance recorded the lowest population T40 (1.01/tree) but its performance did not differ significant with remaining treatment. The highest population was recorded in T2 (1.71). When the maximum and minimum temperature was 30.40C and 22.50C and relative humidity, maximum and minimum 93% and 69% with 118.5 mm rainfall.

DISCUSSION

Before developing insect pest management programmed for specific agro forestry system it is necessary to have the basic information on the seasonal incidence of the insect pest in relation to weather parameter which in determining appropriate time of action and suitable effective method of control.Therefore, the present investigation was carried out with a view of study the effect of different parameter on the incidence of insect pest. In the present studies on the basis of insect pest load and level of infestation of three insect pests i.e. miner leaf (Liriomyzatrifolii) stem fly (Melanagromyzasojae), and white fly (Bemissiatabaci Genn.) were found to be major pest of karanja (Pongamia pinnata L.)The activity of leaf miner was started from 2nd august and continued up to October with insect population insect pest in fourth fort night intervals when the minimum temperature maximum temperature and relative humidity 4.10 25.0 Celsius and 87% respectively. The correlation studies of meteorological parameter with leaf miner population indicate that there is no effect of a biotic factor on the fluctuation of the leaf miner population.

The activity of stem fly started from second standard week and continue up to October 27 last date harvesting of crop with the insect population in 6 slandered week when the minimum maximum temperature and relative humidity were 7.3 calicoes and 26.1 Celsius and 56% respectively. There was no significance relationship between meteorological parameter with stem fly / leaf defoliator infestation. Dashed *et. al* (1999) reported the peak population of stem fly in the first fortnight of august synchronized with repining of the fruit. whereas in the present studies of insect population was recorded in the first of august. However insect population was synchronized with repining of the fruits.

On the basis of average 10 observation recorded at weekly interval all type of insect pest were differ significantly with regard cow bug population. The miner leaf insect population

on different varieties ranged from karanja. This indicates that stem fly white fly was less preferred fallow by minor leaf and leaf defoliator, whereas the number of insect pest per tree of karanja in July months under Agrisilviculture system of agro forestry. No works have been reported by earlier workers with regards to varietals against miner leaf infestation.

On the basis of 6 observation recorded on the percent leaf damage and number of twigs found in karanja tree showed significant and some are non-significant against stem fly The percentage of damage of leaf ranged 45.62% to 56.82%. On the basis of percentage infestation of leaf damage and twigs was found less preferred, whereas number of insect pest attacked on different was highly preferred by some insect months was highly preferred by some insect miner leaf, girdle beetle blue beetle. Arora and co-workers (2001) and sigh Vashishtha (2002) also reported to be more preferred by stem fly.

CONCLUSION

Weekly observation were recorded on the population dynamic and infestation level of insect on different provenances of karanja .five randomly selected branches in each were observed for counting the population of the insect in whole plant .Both healthy and infested branches and twigs of the plant were counted and then the percentage infestation was work out .There were 3 replication and each plant present a replication in a randomized block design.There were two insect pest namely miner leaf (Liriomyzatrifolii) and white fly (Bemissiatabaci) And girdle beetle (Obereopsisbravis.) were found infesting the karanja trees well as soybean crop in Madhya Pradesh. Incidence of cow bug was started from first week of July and continue up to last of September with it peak population in middle of august at temperature minimum maximum relative humidity and rainfall were 23.5 c, 31.5,C and 75%, 88% 122mm respectively .

REFERENCES

Danyk, T.; Mackauer, M. and Johnson, D.L. (2005). The influence of host suitability on the range of grasshopper species utilized by Blaesoxiphaatlanis (Diptera: Sarcophagidae) in the field. Bulletin of Entomological Research. 95(6):571-578.

Dempester, J.P (1969). Some effect on weed control on the number of small cabbage white butter fly on Brussels sprouts. *Journal of applied ecology*. 6:339-345.

Malvia, T.N. (2006). Studied on insect pest complex of KaranjPomgamia pinnata (L.) M.Sc.(Ag.) Unpublished Thesis College of Ag. Gwalior (M.P.).

Mchowa. J. W. and Ngugi, D. N. (1994). Pest complex in agroforestry systems: the Malawi experience. *Forest Ecology and Management*Vol. 64 (2-3) : 277-284.

Nyeko, P.; Edwards-Jones, G. and Day, R.K. (2002). Population dynamics of herbivorous insects and potential arthropod natural enemies on Alnus species in Kabale district, Uganda. Agroforestry Systems. 56(3):213-224.

Rana, N.S., D.K. Rana, A. Gupta, B.C. Shukla and R.N. Sharma (2008). Study o papula dynamics of insect pest of G. max. presented in National Conference on Pest Management Strategies for Food Security held at College of Agriculture IGKV, Raipur (C.G.) from May 2-3 2008, p. 33.

Singh, A.P. (2000). Relative natural resistance of Populus deltoides clones against defoliator Closteracupreata (Lepidoptera: Notodontidae) in northern India. Agroforestry Systems. 49(3):319-326.

Singh, Arun P.; Bhandari, R.S. and Verma, T.D. (2005). Important insect pests of poplars in agroforestry and strategies for their management in northwestern India. Agroforestry Systems. 63(1):15-26.

Venketesan,and G.G. Kundu(1994) Yield infestation relationship and determination of economic injury level of stem fly,(MelanagromyzasojaeZehnt.) infesting soybean. Journals of Entomological Research 18(3); 265-275.

Ward, K.E. and Ward, R.N. (2001). Diversity and abundance of carabid beetles in short-rotation plantings of sweetgum, maize and switchgrass in Alabama. Agroforestry Systems. 53(3):261-267.

Yang, S.J., Jin.S. Qu, G. Luo and W. Ceng (1988). Effect of mixed forest of Chinese fir and Homana on population of insect pests. *Journal of ecology*. 7(1): 45-47.