International Journal of Agricultural Extension and Rural Development Vol. 1 (1), pp. 008-011, August, 2013. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

Screening of certain varieties of *Emblica officinalis* Gaertn. for resistance to insect pests and diseases in central India

P. B. Meshram[1]* and K. K. Soni[2]

[1]Forest Entomology Division, Tropical Forest Research Institute (ICFRE), P. O. RFRC, Mandla Road, Jabalpur- 482021, Madhya Pradesh, India.

[2]Forest Pathology Division, Tropical Forest Research Institute (ICFRE), P. O. RFRC, Mandla Road, Jabalpur- 482021, Madhya Pradesh, India.

Accepted 26 December, 2013

Ten varieties of *Emblica officinalis* Gaertn. including Kanchan, Chakaiya, Francis, NA-7 (Narendra-7), NA-10 (Narendra 10), Anand-1, Anand-2, Krishna, Hatizola (Local) and Local- wild were screened against insect pests that is, gall forming insect (*Betousa stylophora* Swinhoe), leaf roller (*Garcillaria acidula* Forster), bark eating caterpillar (*Indarbela quadrinotata* Walker) and diseases that is vascular wilt (*Fusarium oxysporum f.* sp., *albedinis* Killian & Maire), fruit disease (*Alternaria* sp.). The results revealed that variety NA-10 (Narendra-10) followed by Kanchan was found to be least preferred by *B. stylophora*, *G. acidula*, *I. quadrinotata* and *Alternaria* sps. in clonal seed orchards (CSO). The other test parameters that is, fruit yields, weight/diameter of fruits and the plant morphological characters of the varieties were also studied. Variety of Hatizola (Local) followed by Francis showed less incidence caused by *F. oxysorum* in nursery stage.

Key words: Resistance, varieties, *Emblica officinalis,* insect pests, diseases.

INTRODUCTION

Indian Gooseberry or Aonla, *Emblica officinalis* (Gaertn. Syn. *Phyllanthus emblica*) is an important horticulture crop of India. It is a moderate sized deciduous tree. Fruit, bark and leaves are used in dyeing and tanning. It has aroused good deal of interest among the scientific workers because it is one of the richest natural sources of vitamin 'C' (Ascorbic acid). The fruits are major constituents of 'Chyavanprash' and 'Trifla'. Other uses of fruits are in pickle, marmalade, jam and sauce preparation (Shrivastava, 1990). This economically important tree species is damaged by various insect pests and diseases. Due to the repeated attack of various insect pests and diseases, the growth of plant is stunted (Beeson, 1941). Severe infestation of bark eating caterpillar *Indarbela quadrinotata* may results in the death of the damaged stem and branches but not in the main stem (Mann and Bindra, 1977). Studies on the varietal performance on guava have been reported by Sandhu et al. (1977, 1979), on ber cultivars Mann and Bindra (1977) and on citrus cultivars Sandhu et al. (1979). Variable pattern of susceptibility of *E. officinalis* plant to gall forming insect, *Betousa stylophora* Swinhoe has been observed by Patel et al. (1996). Perusal of literature revealed that, very few and scanty reports are available so far pertaining to the screening of varieties of *E. officinalis* against the insect pests and diseases. In the present study, ten different varieties of *E. officinalis* including Kanchan, Chakaiya, Francis, NA-7 (Narendra-7), NA-10 (Narendra- 10), Anand- 1, Anand-2, Krishna and Hatizola (Local) and Local- wild were screened against the key insect pests that is, gall forming insect *B. stylophora* Swinhoe, leaf roller *Garcillaria acidula* Forster, bark eating caterpillar *I. quadrinotata* Walker and

*Corresponding author. E-mail: pbmeshram@rediffmail.com. Tel: 91-761-2840483(0). Fax: 91-761-2840484.

Table 1. Screening of certain varieties of *E. officinalis* against key insect pests and diseases in clonal seed orchard.

Variety	Larval population of		No. of holes due to	No. of fruits damaged by disease,
	B. stylophora	*G. acidula*	*I. quadrinotata*	*Alternaria* sp.
Kanchan	14.00	10.00	2.0	12.0
Chakaiya	27.00	28.00	8.0	33.0
Francis	18.00	17.00	3.0	12.0
NA-7	18.00	12.00	3.0	13.0
NA-10	11.00	8.00	1.0	7.0
Wild	18.00	14.00	5.0	13.0
S.E. M. ±	7.31	3.05	3.84	3.38
C.D. at 5%	1.62	6.80	8.57	7.54

Figure 1. Gall forming insect, *B. stylophora.*

diseases that is, vascular wilt *Fusarium oxysporum* f.sp. *albedinis* (Killian & Maire), fruit disease *Alternaria* sps. in clonal seed orchards (CSO) and forest nursery which is one of the important component of integrated pest management (IPM).

MATERIALS AND METHODS

Studies were conducted in clonal Seed Orchard (CSO) At Hardi and Central Forest Nursery at Wamandehi (Research and Extension Circles, Reewa and Seoni, Madhya Pradesh, India) during 2006 to 2008. The clonal seed orchard of six varieties of *E. officinalis* including Kanchan, Chakaiya, Francis, NA- 7, NA-10 and Local – wild were raised during 1997 to 1998 on 15 ha area following randomized block design (RBD) with spacing 6x6 m. Eight varieties of *E. officianlis* including Chakaiya, Francis, Kanchan, Anand-1, Anand-2, NA-7, Krishna and Hatizola (Local) were raised in polybags in central Forest Nursery at Wamandehi. The plants were found badly infested by insect pests and diseases. Ten numbers of trees in CSO and one bed (size 10 x 1 m) in nursery from each variety were considered for observations. The observations were recorded during peak period of infestation (August to September). The frass of *I. quadrinotata* was removed with the help of soft wire brush and active holes were counted. Some plant characters of varieties like tree height/girth, number of branches, color texture of shoot and yield parameters such as yield of fruits, weight/diameter of fruits were also observed. Data were recorded and analyzed statistically.

RESULTS

Clonal seed orchard (CSO)

The analyzed presented data in Table 1 showed that, the larval population of insect pests and fruit damaged by diseases varied from 11.00 to 27.00; 8.00 to 28.00; 1.00 to 8.00 and 7.00 to 33.00. Out of six varieties of *E. officinalis* (viz. Kanchan, Chakaiya, Francis, NA-7, NA-10 and Local- wild), NA-10 (Narendra-10) followed by Kanchan were found to be least preferred by gall forming insect *B. stylophora* (Figure 1), defoliator *G. acidula*, bark eating caterpillar *I. quadrinotata* and fruit disease

Table 2. Screening of certain varieties of *E. officinalis* against test parameters in clonal seed orchard.

Variety	Fruit yield (kg/ tree)	Wt of per fruit (g)	Diameter of fruits (cm)	No. of branches	Height (m)	Girth (cm)
Kanchan	60	35.25	4.1	4.0	3.00	77.0
Chakaiya	45	31.22	4.0	4.0	2.70	63.0
Francis	50	19.65	3.6	4.0	2.40	73.0
NA-7	60	25.27	3.3	3.0	3.00	57.0
NA-10	65	38.37	4.2	4.0	3.30	77.6
Wild-Local	12	13.68	3.0	2.0	3.00	74.6
S.E.M. ±	2.36	1.97	1.45	5.77	3.72	2.82
C.D. at 5%	5.26	4.39	3.24	1.28	8.30	6.30

Table 3. Showing morphological characters of certain varieties of *E. officinalis* in clonal seed orchard.

Variety	Tree height	Tree form	Branch	Inter nodal length of shoot	Color of young intermediate shoot	Shoot surface	Prostrated hairs
Kanchan	Tall	Semi-spreading	Terete	0.39	Brownish red	Glabrous	Less-prominent
Chakaiya	Tall	Upright	Terete	0.35	Pinkish	Glabrous	Less-prominent
Francis	Semi-tall	Spreading	Angled	0.34	Brownish red	Glabrous	Prominent
NA-7	Tall	Semi-spreading	Angled	0.28	Pinkish	Glabrous	Prominent
NA-10	Semi-tall	Semi-spreading	Angled	0.40	Brownish	Non-glabrous	Prominent
Wild-local	Semi-tall	Semi-spreading	Terete	0.33	Brownish red	Non-glabrous	Less-prominent

Alternaria species when compared with other varieties.

The data based on other test parameters like fruit yield per tree, weight /diameter per fruit and height/girth of trees are also summarized in Table 2. The results revealed that, NA-10 followed by Kanchan recorded 65 and 60 kg fruits yield per tree, 38.37 and 35.25 g weight per fruit, 4.2 and 4.1 cm diameter of fruit, 4.00 and 4.00 numbers of branches, 3.30 and 3.0 m height and 77.6 and 77.0 cm girth in clonal seed orchard.

The data on other morphological characters of six different varieties are also presented in Table 3. The results indicated that, the difference might be due to non-preferences for diseases and oviposition or shelter to the insect pests. Further studies on plant morphology including volume of tree, bark character, branching habit (provide suitable shelter) and age of trees are needed to correlate the pest infestation.

The trends of results revealed that, NA-10 followed by Kanchan variety of *E. officinalis* showed more resistant in terms of larval population of *B. stylophora*, *G. acidula*, number of holes made by *I. quadrinotata*, number of fruits damaged by *Alternaria* sp., yield, weight / diameter of fruits and height/girth of trees.

Central forest nursery

The data in Table 4 showed that, the incidence of vascular wilt disease *F. oxysporum* (Figure 2) varied from 2.50 to 5.50%. Out of eight varieties of *E. officinalis* (Chakaiya, Francis, Kanchan, Anand-1, Anand-2, NA-7, Krishna, Hatizola-Local), the varieties including, Hatizola-Local (2.50%) followed Francis (2.75%) were least damaged by wilt disease in grafted seedlings in nursery stage. Varieties such as Kanchan (5.50%), Anand-2 (4.12%) and NA-7 (3.87%) showed more susceptible reaction to *F. oxysporum.*

DISCUSSION

Similar preference among fourteen varieties of *E. officinalis* to gall forming insect, *B. stylophora* attack in arid zone region of India was reported (Sandhu et al.,

Table 4. Screening of certain varieties of *E. officinalis* against vascular wilt disease, *F. oxysporum* in forest nursery.

Variety	Total seedlings per bed (size 10x1 m)	Dying of seedlings due to *F. oxysporum*	Incidence (%)
Chakaiya	1600	56	3.50
Francis	1600	44	2.75
Kanchan	1600	88	5.50
Anand-1	1600	28	3.50
Anand-2	1600	33	4.12
NA-7	1600	62	3.87
Krishna	1600	78	3.25
Hatizola (Local)	1600	40	2.50
S.E.M. ±		2.07	
C.D. at 5%		4.52	

Figure 2. Wilt, *F. oxysporum* on seedlings of *E. officinalis.*

1977) where *E. officinalis* varieties Faizabad and Kanchan were found less susceptible to *B. stylophora* than local varieties (Amla-I, Anand- I, III) (Patel et al., 1996). Vascular wilt disease, *F. oxysporum* also reported on the seedlings of *Buchanania lanzan* Spreng. in nursery stage in central India (Soni et al., 2005).

Conclusions

The present study revealed that, resistance and susceptibility against the insect pest and disease can be observed among the varieties of *E. officinalis* suggesting that, the resistant ones should be preferred for various afforestation and rural development programmes. It can be concluded that, varieties such as NA- 10, Kanchan, Hatizola (Local) and Francis were least preferred by insect pests and diseases under tropical climate of central India. Therefore, it is suggested that these varieties may be used for further plantation activities to avoid the frequent damage and losses caused by the insect pests and diseases.

ACKNOWLEDGEMENTS

Authors are thankful to Dr. K. S. Negi, Director, Dr. N. Roychoudhuary, Head, Forest Entomology Division, Tropical Forest Research Institute, Jabalpur and Chief Conservators of Forest, Research and Extension Circles, Rewa and Seoni, Madhya Pradesh, India, for providing necessary field facilities.

REFERENCES

Beeson CFC (1941). The ecology and control of forest insects of India and neighbouring countries. Vasant Press, Dehradun, p. 767.

Mann GS, Bindra OS (1977). Field screening of different jujube cultivars against the bark eating caterpillar. Ind. J. Hortic., 34: 313-315.

Patel VB, Patel JR, Patel NC (1996). Varietal resistance in Aonla to gall forming black caterpillar, *Betousa stylophora*. Guj. Agric. Univ. Res. J., 22: 40-42.

Sandhu GS, Khangura JS, Deol IS (1977). Varietal susceptibility of Guava cultivars to bark eating caterpillar. Punj. Hortic. J., 17: 62-63.

Sandhu GS, Sohi AS, Batra RC (1979). Field performance of bark eating caterpillar *Indarbela quadrinotata* (Walker) on Citrus and Guava cultivars. Ind. J. Entomol., 41: 274-276.

Shrivastava SS (1990). Horticulture Science. Central Block House, Raipur, India, p. 230.

Soni KK, Asaiya, AJ, Nandeshwar DL, Jamaluddin (2005). *Fusarium* wilt of *Buchanania lanzan* Spreng- A new disease record from India. Ind. J. Trop. Biodiv., 13: 112-113.