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INFLORESCENCE GALL PROBLEM OF *PROSOPIS CINERARIA* IN RAJASTHAN

Shiwani Bhatnagar*, Ameen Ullah Khan, Geeta Vishnoi, Lokendra Singh Rathore, Bundesh Kumar, and Sangeeta Singh

Forest Protection Division, Arid Forest Research Institute, Jodhpur

Abstract

Dry pods of the *Prosopis* are the main part of some Rajasthani dishes and also have a broader range of pharmaceutical application. However, due to inflorescence gall formation resulting in obstruction in setting of fruits, there is a decline in the yield of pods of this hardy tree. In severely inflorescence gall affected trees, pods yield get reduced drastically. Gall infested trees appear sick, having large number of unorganized and deformed galls which are round, oblong and spindle-shaped. These galls were initially soft and green in colour but became hard and brown when dried. Heavily infested inflorescence spikes were either completely devoid of pods or only 2-3 pods were seen. Average no. of gall per inflorscence was higher at Phalodi (6.66) followed by Lohawat (4.96) in comparison to average no. of gall per inflorscence at Khejarli (0.63) and Guda Bishnoiya (0.59). Also at all the sites under study average no. of galls per inflorescence on trees of girth class 70-100cm was higher in comparison to trees of girth class 130-160 cm.

Key words: *Prosopis cineraria*, flower gall.

Introduction

Prosopis cineraria the life line of North West arid belt of Rajasthan is the most important tree of this region having immense economic and medicinal value. Khejri tree play significant role in rural economy as a source of top feed, fuel and timber (Parihar, 1993). Green as well as dry pods (Sangri and Khokha) are used as famine food by the local inhabitants (Gupta and Prakash, 1975). It is indigenous to India and in many regions even protected as a sacred tree (Gold and Gujar 2002; Gadgil and Guha 1992). Plant galls represent an unique and complex interspecific interaction and mutual adaptation between the host plant and the gall maker (Mani, 1964). In recently years, a severe infestation of gall was noticed in Jodhpur, Barmer and Bikaner districts of Rajasthan which adversely affected yield of sangria in this region. Thomas Rosamma (Times of India, dated 11 may 2016) reported that Khejri trees were afflicted by mites causing gall formation and have left the fruit (sangria), unfit for human consumption. Due to this, dried sangria which could earlier be purchased for about Rs 200 per kg are costing about Rs 1,000 per kg.

***Author for correspondence :** E-mail : shiwani.bhatnagar@gmail.com

Inflorescence gall is serious problem in Khejri trees as it reduces the pod formation tremendously. Galls are formed as a result of nutritional dependence of gall makers on the plant tissue. Inflorescence gall are unique example of a plant pest relationship causing harmful effects such as hypertrophies and tumorous (neoplasmic) outgrowths. Damage by the plant galls is not only the aesthetic problem but also cause serious problems to the many host plants including *Prosopis cineraria*, *P. glandulosa* var. *torreyana* and *P. velutina* (Kumar and Ahmed, 2004; Mc Kay and Gandolfo, 2007; Parihar, 1993 and Bhansali, 2010). Mani (1948) has also reported similar flower galls in *P. juliflora* due to the mites. Various workers have reported that the abnormal growths within the galls are associated with the various biochemical changes in the levels of carbohydrates, proteins, nucleic acids, phenols, auxin hormone (IAA) and oxidizing enzymes (Arya *et al*., 2010; Gupta, 2011; Bhansali *et al*., 1978; Ramani and Kant, 1989; Raman *et al*., 1989). Present study was undertaken to study the influence of girth of tree on flower/ inflorescence gall formation in Khejri.

Materials and methods

To study of influence of girth of tree on flower gall

formation in Khejri. Flowering trees of three groups based on girth were selected at Phalodi, Lohawat, Khejarli and Guda Bishnoiyan. The trees with flower gall infestation were assessed by the presence and absence of flower gall on the selected trees. Per selected tree three replications were taken for recording observation.

Results and discussion

A preliminary survey was conducted at Phalodi, Lohawat, Khejarli and Guda Bishnoiyan to study of influence of girth of trees on flower gall formation in Khejri. Three flowering trees of three groups each based on girth were selected. It was observed that gall infested trees were sick having large number of unorganized, round, oblong and spindle-shaped galls. The globular shaped galls are many times seen as multi-lobbed structures. These galls were initially green and soft but on maturation became firm to hard at outer shell and brown in colour when dried.

In heavily infested trees 9-12 galls per inflorescence were noticed. Galls varied in size from few mm to 34 mm in diameter. Colour of galls changed from green to brown on maturation during end of May. These galls remained on the trees up to June-July. They are detached due to the heavy load and high wind speed during summer. Heavily infested inflorescence spikes were completely devoid of pods or only 2-3 pods per inflorecence were seen. However, flowers on normal inflorescence ranged from 41-72 per spike with 12-16 pods per inflorescence. Average no. of gall per inflorscence was higher at Phalodi (6.66) followed by Lohawat (4.96) in comparison to Average no. of gall per inflorscence at Khejarli (0.63) and Guda Bishnoiya (0.59). Also on younger trees of girth class 70-100cm average no. of galls per inflorescence was higher in comparison to trees of girth class 130-160 cm at all the sites under study.

Mutitu *et al*. (2010) reported similar findings that L. *invasa* infestation is more severe on young (1-3 yr old) trees than on older trees. Madoffe (1989), results indicated that young pine trees were more vulnerable to Pine Wooly Aphid infestation than old trees. In contrary, Ruohomäki *et al*. (2000) found that *Epirrita autumnata* outbreaks took place mostly in mature birch trees because of low parasitism or high foliage quality and availability of more suitable oviposition sites in mature trees. Accumulation of secondary defense substances-such as tannins, their phenolic precursors, and lignin-are considered defense reactions against wounding or the presence of foreign organisms (Rohfritch, 1981). All secondary defense substances are considered to increase with tree age (Rohfritch, 1981).

Table : Locationwise average no. of galls based on girth of tree.

Site/location	Girth classes of thetree (cm)	Average no. of pods per inflorescence	Average no. of galls per inflorescence
Phalodi	70-100	1.22	8.44
	100-130	1.67	6.44
	130-160	2.22	5.11
	Mean	1.70	6.66
	SD±	0.48	1.52
	CV	0.28	0.23
Lohawat	70-100	0.89	6.56
	100-130	1.78	4.33
	130-160	2.44	4.00
	Mean	1.70	4.96
	SD±	0.69	1.21
	CV	0.41	0.24
Guda Bishnoiyan	70-100	5.33	1.00
	100-130	5.56	0.44
	130-160	7.11	0.34
	Mean	6.00	0.59
	SD±	0.88	0.38
	CV	0.15	0.64
Khejarli	70-100	5.44	1.00
	100-130	5.67	0.56
	130-160	7.44	0.33
	Mean	6.18	0.63
	SD±	1.08	0.33
	CV	0.17	0.53

Fig: Khejri tree infested wih Flower gall

Also, in young trees due to low defense mechanism against pests, infestation may be more. Avearage no. of pods per inflorescence least at Lohawat (1.70) which was at par with Phalodi (1.70) in comparison to Khejarli (6.18) and Guda Bhishnoiya (6.00). Normally in healthy trees 4-5 kg pods are produced per plant (Rathore, 2009). Kumar & Ahmed (2004 & 2006) has reported that in unlopped trees, gall formation was 49.5% of inflorescence and resultant pod production was as minimum as 3.37% where as in lopped trees gall formation reduced considerably (5.56%) and there by pod produced 13.3% more. Bhansali, R. Raj (2012) reported that flower galls are completely made up of ovary tissues. However, Ramani *et al*., (1989) and Gupta (2011) have reported that complex substance rich in nucleic acid and protein produced during the interaction of insect with host tissues might be responsible for the development of galls.

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