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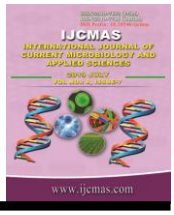

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Population Dynamics of Sesame Broad Mite, *Polyphagotarsonemus latus* (Banks) in Relation to Weather Parameters

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A B S T R A C T

A study on the population dynamics of *Polyphagotarsonemus latus* in relation to weather parameters was carried out at Instructional Farm, Junagadh Agricultural University, Junagadh, Gujarat, India, during the *kharif*-2018. The incidence of *P. latus* on sesame (*Sesame indicum*) was commenced from second week of September and continued till second week of October having a single peak (10.380 mites/leaf) during last week of September in sesame crop. Mites population had positive and significant relationship with bright sunshine hours (BSS) [0.734*]. There was positive and non-significant impact due to maximum temperature (MaxT) [0.396]. However, minimum temperature (MinT) [-0.092], morning and evening relative humidity {RH1 [-0.331], RH2 [-0.442]}, wind velocity (WV) [-0.484] and rain (R) [-0.598] were negatively correlated with the incidence of mites population and the relationship was non- significant.

Introduction

Sesame (*Sesame indicum*) known variously as sesamum, til, gingelly, simsim and gergelim is an important and very ancient oil yielding crop cultivated extensively in India, Burma, China and Japan. It is also cultivated in the hotter and drier parts of Africa and the Mediterranean region. In recent years, the cultivation of sesame has been receiving much attention in the USA, Mexico and in some of the Latin American Countries. Sesame is regarded as the oldest oil yielding plant known to human being. In India this crop grown in area of about 19.50 lakh ha with the production of about 8.5 lakh MT and productivity 436 kg per ha (Anon., 2016).

The productivity of sesame is very low as compared to other oilseeds hence, it is necessary to raise the productivity and thereby total oilseeds production in order to meet edible oil requirement of the country. Sesame has played a major role in the rich and diverse

health and cosmetic traditions of India. Sesame is highly nutritive (oil 50% and protein 25%) and its oil is an excellent vegetable oil because of its high contents of antioxidants such as sesamin, sesamol and sesamolin and its fatty acid composition (Suja *et al.,* 2004). The presence of antioxidants and about 85% unsaturated fatty acids make the oil stable and it has therefore a long shelf life. Seeds are rich source of linoleic acid, vitamin E, A, B1 and B2; minerals including Ca and P. After oil extraction, the remaining meal contains 35- 50% protein, and is rich in tryptophan and methionine. Seed coats are rich in calcium (1.3%) and provide a valuable source of minerals. Sesame cake is nutritious feed for dairy cattle and it can also be used as fertilizer (Ashri, 1998). Among the different insect-pests of sesame, mites *Polyphagotarsonemus latus* (Banks) is more common and destructive pest of sesame. It also found infecting jute, cotton, zinnia, marigold, dahlia, datura, amaranthus, chilli, potato, brinjal, cucurbits, cowpea, cluster bean, sword bean, lablab, moth bean, horse gram, green gram, hollyhock, kidney bean, tea and thorn apple crops in state of Bihar, Karnataka, Maharashtra, Gujarat, Punjab, Uttar Pradesh and West Bengal in India (Gupta, 1985).

Damage is usually confined to undersides of leaves, where areas between veins are reddish brown in colour and young leaves are capped downward and narrow than normal. In region, mites is causing devastating loss since last few years. On the basis of visual observations and morphological characters of the insect, it was found to be *Polyphagotarsonemus latus* (Banks) which was infesting the sesame crop in the experiment. In the situation of global climate change, living organisms are changing their living habitat as well as style which directly affect their span of life. A dominant animal, insect, have capacity to change their behavior and habitat with the changing of the environment and so, the study was carried out to see the impact of changing pattern in abiotic factors on sesame mites.

Materials and Methods

The population study of mites was carried out on sesame variety Gujarat Til - 2 during *kharif*-2018 at Instructional Farm, Junagadh Agricultural University, Junagadh. The crop was grown in a plot size of 20 m x 20 m at the spacing of 45 cm x 15 cm. All other agronomical practices were followed as per the scientific recommendations. The crop under the experiment was kept free from any insecticidal sprays throughout the crop season.

Observations were started from one week after germination and continued till the harvest of the crop at weekly interval. For recording the observations, the plot was divided in ten equal quadrates each of size 2.0 m x 2.0 m from which 5 plants were randomly selected and tagged. Mite population was recorded from three (upper, middle and lower) leaves of top 50 cm main shoot from randomly selected plant in each sector and brought to the laboratory in a perforated polythene bag. The number of nymphs and adults were recorded with the help of leica and population was expressed as number of nymphs and adults per leaf. The weekly meteorological data were obtained from the meteorological observatory of Junagadh Agricultural University, Junagadh. With a view to study the impact of different abiotic factors on pest incidence, a simple correlation between pest population and weather parameters was worked out.

Results and Discussion

The activity of mites was recorded from plants periodically at weekly interval. The data recorded on the infestation to plants were correlated with the various abiotic factors to see the relationship with the incidence of pest.

The data presented in Table 1 indicates that the incidence of broad mites, *P. latus* was commenced from second week of September *i.e.,* 37th Standard Meteorological Week (SMW) and 52 days after sowing (DAS) and continued till second week of October (41th SMW) *i.e.* 80 DAS which ranged from 2.460 to 10.380 mites/leaf. The population of *P. latus* was fluctuated during the crop period. The infestation (2.460 mites/leaf) was started from second week of September (37th SMW) and showed its first peak (10.380 mites/leaf) during last week of September (39th SMW). In subsequent weeks, the incidence was decreased and reached to 3.333 mites/leaf during second week of October (41th SMW). Starting from the seven week after germination of the crop, pest showed continuous trend of increasing and after reaching its first peak mites were continuously decreased.

In the present investigation, it was observed that due to continuous feeding of this pest, the growth of the crop was retarded. After 63 days of germination, the crop itself found capable to withstand against the pest population and the pest was also decreased after 63 days of germination. The similar trend was observed by Meena *et al.,* (2013) in which mites population was maximum during the second week of September. According to Vichitbandha and Chandrapatya (2011), the mite started building up its population from the end of September and reached their peak after mid-October.

Table.1 Incidence of broad mites, *P. latus* in sesame

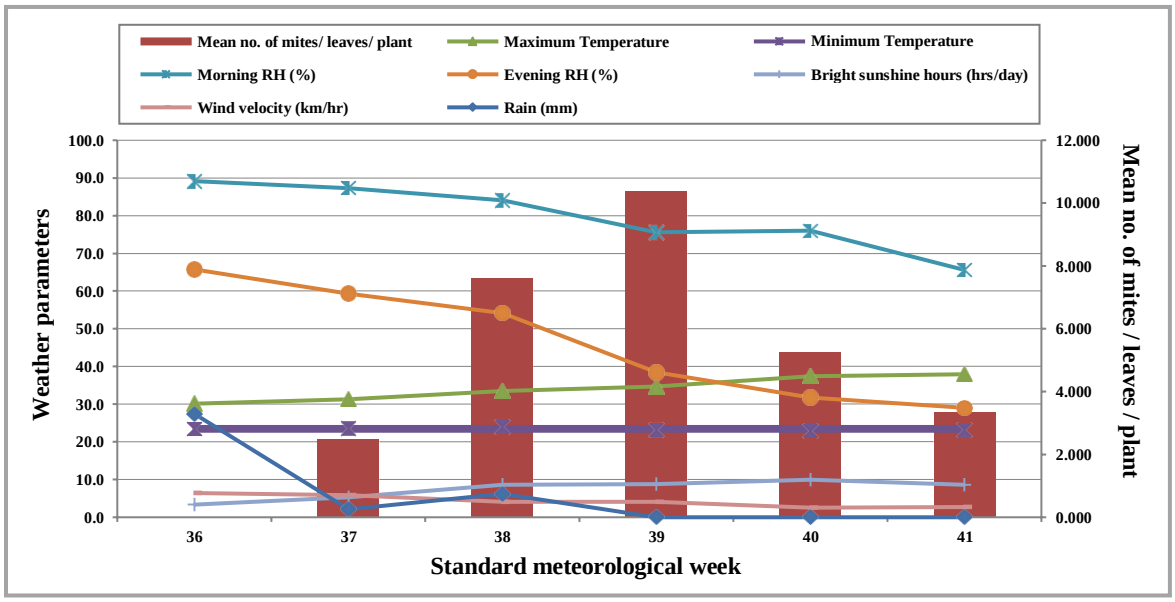
Sr. No.	SMW	Month	Mean mites/leaf
1	31		**0.000**
2	32		**0.000**
3	33	August	**0.000**
4	34		**0.000**
5	35		**0.000**
6	36		**0.000**
7	37	September	**2.460**
8	38		**7.600**
9	39		**10.380**
10	40	October	**5.260**
11	**41**		**3.333**

Note: SMW: Standard metrological week

Table.2 Correlation of broad mites, *P. latus* with abiotic factors in sesame

Factors	Mites
Bright Sunshine Hours, hrs/day (BSS)	**0.734***
Maximum Temperature, ℃ (MaxT)	**0.396**
Minimum Temperature, ℃ (MinT)	**-0.092**
Morning Relative Humidity, % (RH1)	**-0.331**
Evening Relative Humidity, % (RH2)	**-0.442**
Wind Velocity, kmhr^{-1} (WV)	**-0.484**
Rain, mm (R)	**-0.598**
*** Significant at 5% level; r = 0.602**	

Figure-1 Population dynamics of broad mites, *P. latus* on *kharif* sesame under field condition



The results summarized in Table 2 reveals that the association between mite population and weather factors indicated that there was positive significant impact on the incidence of *P. latus* due to bright sunshine hours (BSS) [0.734*]. There was positive and non-significant impact due to maximum temperature (MaxT) [0.396]. There was no any significant linear correlation either negative or positive between incidences of mites population for rest of the abiotic factors. However, minimum temperature (MinT) [-0.092], morning and evening relative humidity (RH1 [-0.331], RH2 [-0.442]), wind velocity (WV) [-0.484] and rain (R) [-0.598] were negatively correlated with the incidence of mites population and the relationship was non-significant.

The population of mites was influenced by so many abiotic factors which has positive relationship with bright sunshine hours (Roopa and Kumar, 2014; Bathari *et al.*, 2016; Pal and Karmakar, 2017), maximum temperature (Chavan *et al.*, 2003; Karmakar and Mazumdar, 2007; Montasser *et al.*, 2011; Patil *et al.*, 2013; Pal and Karmakar, 2017). While looking to the negative relationship, the pest was influenced by minimum temperature (Ahuja, 2000; Bhede *et al.*, 2008; Roopa and Kumar, 2014; Bathari *et al.*, 2016; Hassan, 2016), morning and evening relative humidity (Bhede *et al.*, 2008; Patil and Nandihalli, 2009; Singh and Singh, 2012; Patil *et al.*, 2013; Bathari *et al.*, 2016), wind velocity (Karmakar and Mazumdar, 2007), rainfall (Ahuja, 2000; Chavan *et al.*, 2003; Patil and Nandihalli, 2009; Singh and Singh, 2012; Bathari *et al.*, 2016). The variation in the results are due to different regions, sowing periods, crop stages, environmental conditions, different host crop etc. but it is cleared that the mites population is highly fluctuates by temperature and humidity effect.

References

Ahuja, D. B. 2000. Influence of abiotic factors on the population of mite, *Polyphagotarsonemus latus* (Banks) infesting sesame (*Sesamum indicum L*) in the arid region of Rajastan (India). *Journal of the Entomological Research Society*, 24(1): 87-89.

Anonymous 2016. Directorate of Agriculture Gujarat State, Gandhinagar. Available

at http://dag.gujarat.gov.in/Portal/ News/474124th-Adv- ESt-2015-16.pdf *accessed on 19 January, 2018.*

Ashri, A. 1998. Sesame breeding. *Plant Breeding Research*, 16: 179-228.

Bathari, M.; Rahman, S. and Sharmah, D. 2016. Incidence and population builds up of *P. lotus* infesting *Capsicum chinense* Jacq. S.in relation to weather factors. *International Journal of Plant Protection*, 9(2): 578-582.

Bhede, B. V.; Bhosle, B. B. and More, D. G. 2008. Influence of meterological factors over the incidence of chilli mite, *Polyphagotarsonemus latus* and its chemical control strategies. *Indian Journal of Plant Protection, 26*: 200-203.

Chavan, B. P.; Kadam, J. R. and Koli, H. R. 2003. Effects of dates of sowing on incidence of red spider mite, *Tetranychus cinnabarinus* (Boisd) infesting okra. In: *Proceedings of State Level Seminar on Pest Management for Sustainable Agriculture*. February 6- 7, 2003, Marathwada Agricultural University, Parbhani (M.S.) India, pp. 187-188.

Gupta, S. K. 1985. Hand book Plant Mites of India. Shri Aurobindo Press. Kolkota, pp. 292-294.

Hassan, L. 2016. Population Dynamics of *Polyphagotarsonemus latus* (Banks) (Acari: Tarsonemidae) on Common Potato Cultivars in Egypt. *Egyptian Academic Journal of Biological Sciences*, 9(4): 173–180.

Karmakar, K. and Mazumdar, D. 2007. Population dynamics of yellow mite, *Polyphagotarsonemus latus* (Banks) (Acari: Tarsonemidae) on different cultivars of jute (*Corchorus* spp. L.) in relation to some abiotic parameters. *International Journal of Acarology*, 16(1&2): 43.

Meena, R. S.; Ameta, O. P. and Meena, B. L. 2013. Population dynamics of sucking pests and their correlation with weather parameters in chilli, *Capsicum annum* L. crop. *An International Quarterly Journal of Life Sciences*, 8: 177-180.

Montasser, A. A.; Marzouk, A. S.; Hanafy, A. R. I. and Hassan, G. M. 2011. Seasonal fluctuation of the broad mite *Polyphagotarsonemus latus* (Acari: Tarsonemidae) and its predatory mites on some pepper cultivars in Egypt. *International Journal of Environmental Science and Engineering*, 2: 9-20.

Pal, S. and Karmakar, K. 2017. Population dynamics and management of yellow mite, *Polyphagotarsonemus latus* (Banks) (Acari: Tarsonemidae) infesting gerbera under protected cultivation. *Journal of Entomology and Zoology Studies*, 5(5): 795-799.

Patil, J.; Ashoka, J.; Bheemanna, M.; Sreenivas A. G. and Naganagoud, A. 2013. Seasonal incidence of sucking pests on Mulberry correlated with weather parameters. *Annals of Plant Protection Sciences*, 21(2): 261-264.

Patil, R. S. and Nandihalli, B. S. 2009. Seasonal incidence of mite pests on brinjal and chilli. *Karnataka Journal of Agricultural Sciences*, 22: 729-731.

Roopa, M. and Kumar, C. T. A. 2014. Seasonal incidence of pests of capsicum in bangalore conditions of Karnataka, India. *Global Journal of Biology, Agriculture and Health Sciences*, 3: 203-207.

Singh, A. P. and Singh, R. N. 2012. Effect of abiotic factors on the population dynamics of yellow mite, *Polyphagotarsonemus latus* (Banks) on chilli crop in Varanasi. *Journal of Insect Sciences*, 25: 237-240.

Suja, K. P.; Abraham, J. T.; Thamizh, S. N.; Jayalekshmy, and Arumughan, C. 2004. Antioxidant efficacy of sesame cake extract in vegetable oil protection. *Food*

Chemistry, 84(3): 393-400.
Vichitbandha, P. and Chandrapatya, A. 2011. Broad mite effects on chili shoot damage and yields. *Pakistan Journal of Zoology*, 43: 637-649.

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