



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2022; SP-11(7): 4009-4013  
© 2022 TPI  
[www.thepharmajournal.com](http://www.thepharmajournal.com)  
Received: 25-05-2022  
Accepted: 29-06-2022

**Kamini**  
Department of Entomology,  
BTC CARS, Indira Gandhi  
Krishi Vishwavidyalaya, Raipur,  
Chhattisgarh, India

**AK Awasthi**  
Department of Entomology,  
BTC CARS, Indira Gandhi  
Krishi Vishwavidyalaya, Raipur,  
Chhattisgarh, India

**Avinash Gupta**  
Department of Entomology,  
BTC CARS, Indira Gandhi  
Krishi Vishwavidyalaya, Raipur,  
Chhattisgarh, India

**RKS Tomar**  
Department of Entomology,  
BTC CARS, Indira Gandhi  
Krishi Vishwavidyalaya, Raipur,  
Chhattisgarh, India

**Divedi Prasad Chowdhary**  
Department of Entomology,  
BTC CARS, Indira Gandhi  
Krishi Vishwavidyalaya, Raipur,  
Chhattisgarh, India

**NK Chaure**  
Department of Entomology,  
BTC CARS, Indira Gandhi  
Krishi Vishwavidyalaya, Raipur,  
Chhattisgarh, India

**Archana Kerketta**  
Department of Entomology,  
BTC CARS, Indira Gandhi  
Krishi Vishwavidyalaya, Raipur,  
Chhattisgarh, India

**Corresponding Author**  
**Kamini**  
Department of Entomology,  
BTC CARS, Indira Gandhi  
Krishi Vishwavidyalaya, Raipur,  
Chhattisgarh, India

## Seasonal incidence of hairy caterpillar (*Euproctis lunata*) on apple ber (*Zizyphus mauritiana*) and its correlation with abiotic factors

**Kamini, AK Awasthi, Avinash Gupta, RKS Tomar, Divedi Prasad Chowdhary, NK Chaure and Archana Kerketta**

### Abstract

The present investigation was undertaken to observe the seasonal incidence of hairy caterpillar (*Euproctis lunata*) on apple ber at Dry Land Horticulture Research Farm, Pt. Shiv Kumar Shastri College of Agriculture and Research Station, Surgi, Rajnandgaon during 2021- 22. The studies revealed that the first incidence of hairy caterpillar was recorded during first week of July (27<sup>th</sup> SMW) with peak population (4.28 larvae / meter branch) in the last week of September (39<sup>th</sup> SMW). The larval population was recorded in the range from 0.06 to 4.28 larvae / meter branch. The population of hairy caterpillar was significantly positively influenced by maximum temperature ( $r = 0.647$ ), minimum temperature ( $r = 0.826$ ), average temperature ( $r = 0.826$ ), morning relative humidity ( $r = 0.533$ ), evening relative humidity ( $r = 0.710$ ) and average relative humidity ( $r = 0.711$ ) however, sunshine ( $r = -0.343$ ) was significantly negatively influenced the population of the pest.

**Keywords:** *Euproctis lunata*, apple ber, *Zizyphus mauritiana*, abiotic factor

### Introduction

The apple ber (*Zizyphus mauritiana*) is an important fruit crop of tropical and sub-tropical regions. It belongs to the family Rhamnaceae. It is mainly grown in central Asia. It is resistance to grow in drought and other diversified soil and climatic conditions. It is a Thailand ber variety which is crossed between green apple and jujube and it is also known as the Indian jujube or Chinese date. Its name signifies size and appearance of green apple fruit and that is the reason, it is named as 'Green Apple' or 'Thai Apple Ber'.

Apple ber is an evergreen shrub or tree up to 10-15 feet height, with trunk 30-40 cm. or more in diameter and many drooping branches. The flowers of the apple ber are pale white pentamorous. Plant starts giving fruits after 6-8 months of plantation. The fruit shape of apple ber is ovate and oblong. The colour of mature fruit and pulp of ber is light green and creamy white (Khanikar *et al.*, 2021) [5]. The weight of each fruit is around 150-200 gm. Fruits are mainly produced from November to March. It is very attractive, sweet, crispy and juicy.

The roots have wound healing properties too. The fruit has been used in traditional medicine as an emollient, expectorant, coolant, anodyne and tonic, it also has been used as an antidote for aconite poisoning. It is given to relieve abdominal pains during pregnancy and can be applied to wounds when used in a poultice (Reddy, O.2017) [7]. Apple ber is multi-purpose tree. The fruits can be processed into various quality products like candy, jam, jelly (Deshmukh, S.2017) [2], apple ber powder (Mathangi, S. and Prakash Maran, J.2020) [6] and apple ber tutti frutti (Bhand *et al.*, 2021) [1].

In india, more than 130 species of insect pests are found to infest on ber, only few species have attained the pest status and cause substantial economic damage to ber. A total of twelve insect pests infesting on ber have been recorded from hot arid region of Rajasthan. Out of these, three insects viz., ber fruit fly (*Carpomyia vesuviana* Costa), fruit borer (*Meridarchis scyroides*) and stone weevil (*Aubeus himalayanus* Voss) were recorded as major pests with high infestation rate, whereas two insects, ber butterfly, *Tarucus theophrastus* (Fabricius) and thrips, *Scirtothrips dorsalis* (Hood) were recorded as moderate pests (Haldhar *et al.*, 2016) [3]. Yadav, J. (2017) [8] reported *E. lunata* was active from July to September with the average larval population of 1-2 larvae / branch.

## Materials and Methods

The field experiment was conducted during 2021 – 22 at Dry Land Horticulture Research Farm, Pt. Shiv Kumar Shastri College of Agriculture and Research Station, Surgi, Rajnandgaon (C.G.). The geographical situation of Rajnandgaon is on 21°06'N latitude and 81° 02'E longitude on the banks of Shivnath River and at height of 307 meters above mean sea level. The seasonal incidence of hairy caterpillar was recorded during *kharif-rabi*, 2021-22. The pest population of hairy caterpillar was recorded weekly by randomly selecting 10 plants from each pruned and unpruned plants of apple ber and then after selecting five branches, each of 1 meter length were selected from all four directions i.e., North, South, East, and West of the plant. The data obtained was correlated with various abiotic factors and correlation coefficient was worked out as suggested by Snedecor and Cochran, 1967. The graphical representation was also applied to depict the seasonal incidence of the hairy caterpillar.

## Result and Discussion

The seasonal incidence of hairy caterpillar *E. lunata* infesting apple ber during *kharif – rabi* 2021-22 is presented in Table 1 under pruned condition. The seasonal incidence of hairy caterpillar (1.20 larvae / meter branch) was recorded in the first week of July (27<sup>th</sup> SMW) at vegetative stage and pest remained active until first week of December (49<sup>th</sup> SMW) at fruiting stage. The maximum larval population (4.30 larvae / meter branch) was observed during last week of September (39<sup>th</sup> SMW) at flowering stage. After that, pest population continuously declined and reached minimum (0.12 larvae / meter branch) during first week of December (49<sup>th</sup> SMW) with the seasonal mean of 1.82 larvae / meter branch.

Under unpruned condition, the data of seasonal incidence of hairy caterpillar *E. lunata* infestation on apple ber during *kharif – rabi* 2021-22 is presented in Table 1. The seasonal activity of hairy caterpillar (1.08 larvae / meter branch) was initially detected during the first week of July (27<sup>th</sup> SMW). The peak activity period of hairy caterpillar (4.26 larvae / meter branch) was observed in the last week of September (39<sup>th</sup> SMW) at flowering stage. The lowest larval population of (0.34 larvae / meter branch) was recorded in last week of November (48<sup>th</sup> SMW) at fruiting stage with the seasonal mean of 1.73 larvae / meter branch.

### Effect of ambient weather on mean fluctuation of hairy caterpillar population under pruned and unpruned condition on apple ber.

In nature, the population of insect pests is never truly stable. The fluctuation of population of any organisms depends on many biotic and abiotic factors like temperature, relative humidity, rainfall and sunshine hours etc. To know the effect of various weather parameters on the average population of hairy caterpillar in apple ber ecosystem under pruned and unpruned condition, present study was carried out during *kharif – rabi*, 2021 – 22. During the time of observation, weekly fluctuation of maximum and minimum temperature

varied from 24.30 °C to 33.60 °C and 8.65 °C to 26.00 °C, respectively. The morning and evening relative humidity ranged from 82.00 to 95.00 and 25.50 to 75.43 per cent, respectively. Rainfall varies from 1.00 to 33.69 mm. The sunshine hours fell in between 1.27 to 9.03 lux. Simple correlation was worked out between weekly population of hairy caterpillar and different weather parameters which are given in Table 2 and Table 3.

First appearance of hairy caterpillar was observed in the first week of July with 1.14 larvae / meter branch which was associated with the maximum and minimum temperature of 33.60 °C and 25.81 °C and morning and evening relative humidity of 84.00 and 60.14 per cent, respectively with, rainfall 13.57 mm with sunshine hours 2.13 lux. The highest larval population (4.28/ meter branch) of hairy caterpillar was attained during last week of September (39<sup>th</sup> SMW). Yadav, J., (2017) [8] reported *E. lunata* was active from July to September with the average larval population of 1-2 larvae / branch. Maximum larval population of *E. lunata* was 10.4 / 100 leaves observed in last week of September reported by Kansal, A.K., (1990) [4]. The weather condition prevailed during this period were maximum temp. 32.80 °C, minimum temp. 25.26, average temp. 29.03, morning relative humidity 89.29%, evening relative humidity 60.71%, average relative humidity 75.00%, sunshine 7.49 lux with no rainfall.

### Correlation of hairy caterpillar with different weather parameters

The correlation studies of hairy caterpillar with different weather parameter showed a significantly positively correlation with maximum temperature ( $r = 0.647$ ), minimum temperature ( $r = 0.826$ ), average temperature ( $r = 0.826$ ), morning relative humidity ( $r = 0.533$ ), evening relative humidity ( $r = 0.710$ ) and average relative humidity ( $r = 0.711$ ) but sunshine ( $r = -0.343$ ) showed a significantly negatively correlation, while rainfall was not found to be significantly correlated with hairy caterpillar. The regression equation between hairy caterpillar and maximum temperature ( $y = 0.39x - 10.09$ ,  $R^2 = 0.418$ ) depicts that at every unit increase in maximum temperature, the population level increase by 0.39 units, for minimum temperature ( $y = 0.204x - 2.162$ ,  $R^2 = 0.681$ ) depicts that at every unit increase in minimum temperature, the population level increase by 0.204 units, for average temperature ( $y = 0.309x - 5.917$ ,  $R^2 = 0.686$ ) depicts that at every unit increase in average temperature, the population level increase by 0.309 units, for morning relative humidity ( $y = 0.229x - 18.59$ ,  $R^2 = 0.284$ ) depicts that at every unit increase in morning relative humidity, the population level increase by 0.229 units, for evening relative humidity ( $y = 0.060x - 1.365$ ,  $R^2 = 0.504$ ) depicts that at every unit increase evening relative humidity, the population level increase by 0.060 units, for average relative humidity ( $y = 0.104x - 5.619$ ,  $R^2 = 0.505$ ) depicts that at every unit increase in average relative humidity, the population level increase by 0.104 units.

**Table 1:** Weekly population (no.) of hairy caterpillar on apple ber under pruned and unpruned condition during, *Kharif – rabi*, 2021–22 at Surgi, Rajnandgaon

SMW	Date of observation	Mean larval population (no.) of hairy caterpillar / meter branch	
		Pruned condition	Unpruned condition
27	02/07/2021	1.20	1.08
28	09/07/2021	1.71	1.53
29	16/07/2021	2.09	2.01
30	23/07/2021	2.43	2.28
31	30/07/2021	2.45	2.39
32	06/08/2021	2.71	2.54
33	13/08/2021	3.58	3.43
34	20/08/2021	3.05	2.97
35	27/08/2021	3.43	3.35
36	03/09/2021	3.20	3.11
37	10/09/2021	3.60	3.48
38	17/09/2021	3.97	3.87
39	24/09/2021	4.30	4.26
40	01/10/2021	4.18	4.13
41	08/10/2021	3.86	3.64
42	15/10/2021	3.51	3.45
43	22/10/2021	3.23	3.18
44	29/10/2021	2.93	2.86
45	05/11/2021	2.49	2.41
46	12/11/2021	1.78	1.66
47	19/11/2021	1.24	0.86
48	26/11/2021	0.73	0.34
49	03/12/2021	0.12	0
50	10/12/2021	0.00	0
51	17/12/2021	0.00	0
52	24/12/2021	0.00	0
1	01/01/2022	0.00	0
2	08/01/2022	0.00	0
3	15/01/2022	0.00	0
4	22/01/2022	0.00	0
5	29/01/2022	0.00	0
6	05/02/2022	0.00	0
7	12/02/2022	0.00	0
8	19/02/2022	0.00	0
Seasonal mean		1.82	1.73

SMW = Standard Meteorological Week

**Table 2:** Effect of weather parameter on mean seasonal fluctuation of hairy caterpillar population under pruned and unpruned condition on apple ber during, *kharif – rabi*, 2021-22 at Surgi, Rajnandgaon

SMW	Date of observation	Temperature (°C)			Relative humidity (%)			Rainfall (mm)	Sunshine hours (lux)	Average Hairy caterpillar / meter branch (no.)
		Max. Temp. (°C)	Min. Temp. (°C)	Average Temp. (°C)	Morning RH (%)	Evening RH (%)	Average RH (%)			
27	02/07/2021	33.60	25.81	29.71	84.00	60.14	72.07	13.57	2.13	1.14
28	09/07/2021	33.39	25.03	29.21	90.29	74.00	82.15	9.63	1.99	1.62
29	16/07/2021	32.99	26.11	29.55	91.14	73.43	82.29	5.69	2.41	2.05
30	23/07/2021	32.27	25.93	29.10	90.71	73.86	82.29	4.27	1.27	2.36
31	30/07/2021	33.29	26.00	29.65	85.14	65.86	75.50	3.37	5.53	2.42
32	06/08/2021	30.49	25.46	27.98	89.00	72.29	80.65	11.69	1.84	2.63
33	13/08/2021	28.44	25.13	26.79	91.86	69.43	80.65	10.17	2.41	3.51
34	20/08/2021	31.00	25.46	28.23	91.43	69.14	80.29	4.26	5.46	3.01
35	27/08/2021	29.76	24.61	27.19	92.14	70.57	81.36	33.69	4.03	3.39
36	03/09/2021	32.89	25.96	29.43	90.14	63.29	76.72	1.14	6.53	3.16
37	10/09/2021	33.17	25.97	29.57	94.00	74.71	84.36	9.14	3.84	3.54
38	17/09/2021	32.69	25.77	29.23	94.00	75.43	84.72	2.34	3.50	3.92
39	24/09/2021	32.80	25.26	29.03	89.29	60.71	75.00	0.00	7.49	4.28
40	01/10/2021	31.80	24.96	28.38	92.71	71.57	82.14	1.83	5.20	4.16
41	08/10/2021	32.53	25.26	28.90	95.00	70.43	82.72	0.00	4.84	3.75
42	15/10/2021	31.94	24.41	28.18	89.14	44.86	67.00	1.00	7.66	3.48
43	22/10/2021	32.56	20.11	26.34	86.43	60.86	73.65	0.00	7.93	3.21
44	29/10/2021	31.80	17.43	24.62	86.86	39.00	62.93	0.00	7.80	2.90
45	05/11/2021	30.31	12.53	21.42	89.71	34.00	61.86	0.00	9.03	2.45

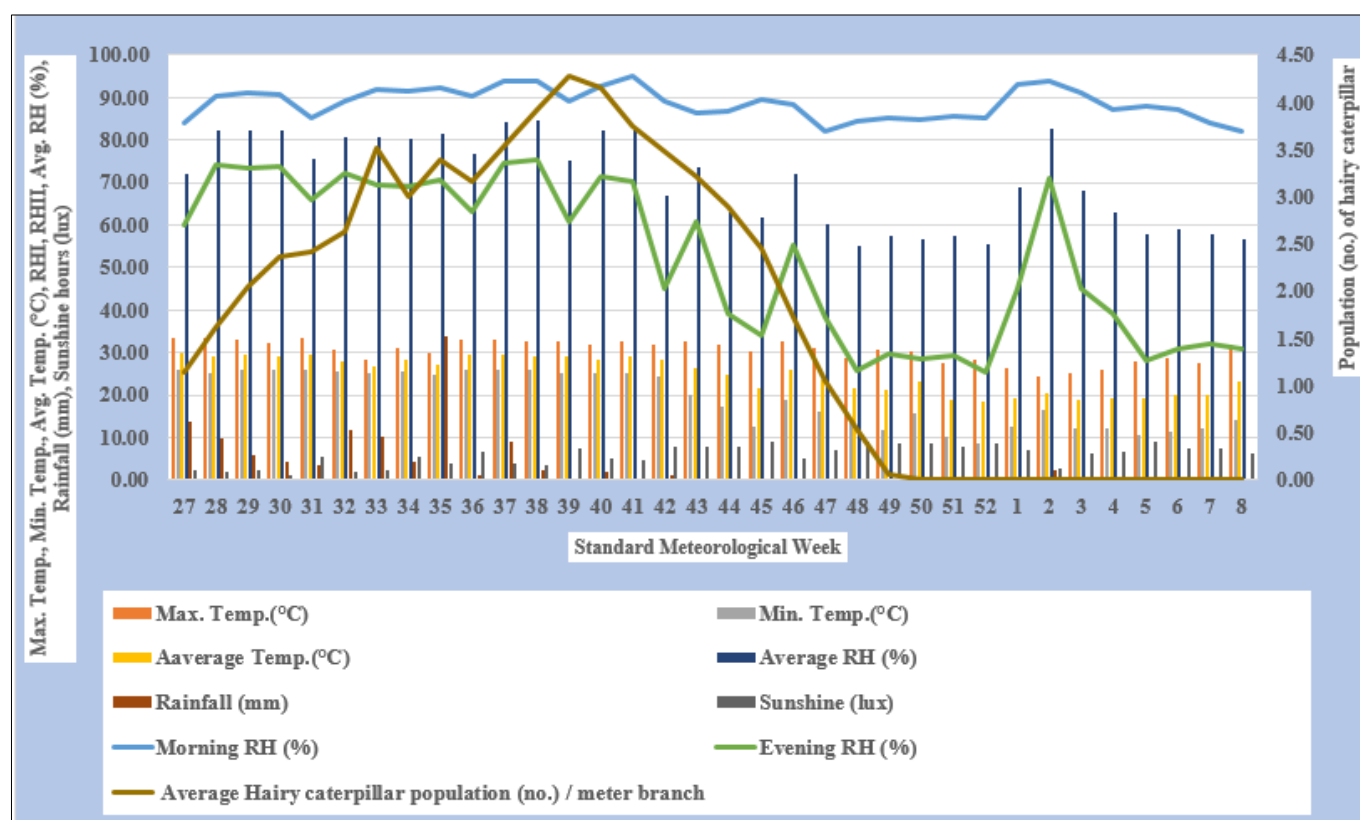
46	12/11/2021	32.67	18.93	25.80	88.43	55.43	71.93	0.00	5.17	1.72
47	19/11/2021	30.97	15.90	23.44	82.14	38.29	60.22	0.06	6.93	1.05
48	26/11/2021	28.60	14.66	21.63	84.43	25.57	55.00	0.00	8.79	0.54
49	03/12/2021	30.67	11.89	21.28	85.29	29.71	57.50	0.00	8.44	0.06
50	10/12/2021	30.16	15.80	22.98	84.71	28.29	56.50	0.00	8.49	0.00
51	17/12/2021	27.66	10.27	18.97	85.71	29.14	57.43	0.00	7.83	0.00
52	24/12/2021	28.41	8.65	18.53	85.13	25.50	55.32	0.00	8.69	0.00
1	01/01/2022	26.30	12.40	19.35	93.00	45.00	69.00	0.00	6.90	0.00
2	08/01/2022	24.30	16.60	20.45	94.00	71.00	82.50	2.10	2.80	0.00
3	15/01/2022	25.30	12.20	18.75	91.00	45.00	68.00	0.00	6.10	0.00
4	22/01/2022	26.00	12.10	19.05	87.00	39.00	63.00	0.40	6.70	0.00
5	29/01/2022	27.80	10.70	19.25	88.00	28.00	58.00	0.00	8.90	0.00
6	05/02/2022	28.50	11.40	19.95	87.00	31.00	59.00	0.00	7.50	0.00
7	12/02/2022	27.60	12.30	19.95	84.00	32.00	58.00	0.00	7.30	0.00
8	19/02/2022	31.90	14.20	23.05	82.00	31.00	56.50	0.00	6.30	0.00
Overall Seasonal mean										1.77

SMW = Standard Meteorological Week

**Table 3:** Correlation coefficient (r) of meteorological parameters on hairy caterpillar of apple ber

Weather parameter	Correlation coefficient (r)
Maximum Temperature (°C)	0.647**
Minimum Temperature (°C)	0.826**
Average Temperature (°C)	0.826**
Morning Relative humidity (%)	0.533**
Evening Relative humidity (%)	0.710**
Average Relative humidity (%)	0.711**
Rainfall (mm)	0.315
Sunshine hours (lux)	-0.343*

\*Significant at 5%, \*\*Significant at 1%



**Fig 1:** Effect of weather parameter on seasonal fluctuation of hairy caterpillar on apple ber during, *kharif – rabi*, 2021-22 at Surgi, Rajnandgaon

**Conclusion**

The result of the present study concluded that under pruned condition, the first appearance of hairy caterpillar (*Euproctis lunata*) was observed in the first week of July (27th SMW) with the mean population of 1.20 larvae / meter branch at vegetative stage. The pest population remained available in

the field up to the first week of December (49th SMW). The peak population 4.30 larvae / meter branch was observed during third week of September at flowering stage. While, the first incidence of the pest was recorded on apple ber during first week of July (27th SMW) with mean population of 1.08 larvae / meter branch under unpruned condition. The highest

population of hairy caterpillar 4.26 larvae / meter branch was observed during last week of September (39th SMW) at flowering stage.

The average seasonal fluctuation in the population of hairy caterpillar denoted that the first appearance of the pest was observed in the first week of July with 1.14 larvae / meter branch which was associated with the maximum and minimum temperature of 33.60°C and 25.81°C and morning and evening relative humidity of 84.00 and 60.14 per cent, respectively with, rainfall 13.57 mm with sunshine hours 2.13 lux. The highest average larval population (4.28/ meter branch) of hairy caterpillar was attained during last week of September (39th SMW) both under pruned and unpruned condition of apple ber. The average population of hairy caterpillar was significantly positively influenced by maximum temperature ( $r = 0.647$ ), minimum temperature ( $r = 0.826$ ), average temperature ( $r = 0.826$ ), morning relative humidity ( $r = 0.533$ ), evening relative humidity ( $r = 0.710$ ) and average relative humidity ( $r = 0.711$ ) however, sunshine ( $r = -0.343$ ) was significant negatively influenced both under pruned and unpruned condition on apple ber.

### References

1. Bhand S, Shubham BB, Mishra S, Prasad VM, Bahadur V. Standardization of a recipe for the preparation of tutti-frutti from Apple ber (*Zizyphus mauritiana* L.). The pharma innovation Journal. 2021;10(12):1293-1297.
2. Deshmukh S. Studies on post-harvest management of apple ber fruits and its exploration in value added fruit. M. tech. Thesis, Vasantrya Naik Krishi Vidhyapeeth, parbhani, 2017, 89p.
3. Haldhar SM, Deshwal HL, Jat GC, Berwal MK, Singh D. Pest scenario of ber (*Zizyphus mauritiana* Lam.) in arid regions of Rajasthan: a review. Journal of Agriculture and Ecology. 2016;1:10-21.
4. Kansal Ambreesh Kumar. Biological Studies of the hairy caterpillar complex of Jujube and Pear. M.Sc. (Ag.) Thesis, College of Agriculture, Punjab Agricultural University, Ludhiana-141004, 1990.
5. Khanikar H, Langhasa S, Hazarika DN, Goswami RK, Deori GD. Studies on Physico-chemical characters of Thai Apple ber (*Zizyphus mauritiana* Lamk.) grown in Assam. Journal of Pharmacognosy and Phytochemistry 2021;10(3):187-192.
6. Mathangi S, Prakash Maran J. A study on apple ber to identify the suitability of new product development. Department of Food Science and Nutrition, Periyar University, Salem, Tamil Nadu, India. Plant Science Today. 2020;7(1):61-69.
7. Reddy O. Apple ber is common man apple with multiple health benefits, 2017.
8. Yadav J. Population dynamics and varietal / germplasm screening against ber fruit fly, *Carpomyia vesuviana* (Costa) on ber. M.Sc. (Ag.) Thesis, College of Agriculture, Chaudhary Charan Singh Haryana Agricultural University, Hisar-125004, Haryana, India, 2017.