Int.J.Curr.Microbiol.App.Sci (2017) *6*(10): 4853-4859

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 6 Number 10 (2017) pp. 4853-4859**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2017.610.453

Assessment of Brushing Date and Direction on Tasar Silkworm *Antheraea mylitta* D Production and Protection

J. Singh[1]*, A. Kumar[1], S. Mukherjee[1], G.P. Singh[1], S. Ray[1], K.S. Rawat[2] and A.K. Sinha[1]

[1]Central Tasar Research and Training Institute, Ranchi, Jharkhand – 835303, India
[2]Centre for Remote Sensing and Geo-Informatics, Sathyabhama University, Chennai- 600119 (T.N), India
**Corresponding author*

Keywords

Brushing date, Direction, Congenial weather, Pest outbreak, Standard meteorological week (SMW) etc.

Article Info

Accepted:
29 September 2017
Available Online:
10 October 2017

A B S T R A C T

Impact of brushing date and direction on pest severity and cocoon production in tasar silkworm was studied. Appropriate direction as well as date of brushing has important role in suppression of pest and predators without use of harmful chemicals. Brushing of tasar silkworm was done on three dates viz., 16th, 21st, and 26th at an interval of 5 days in four directions *viz.*, North, South, East and West. Regular monitoring of weather data's (maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, rainfall and it converted into weekly), cocoon quality (numbers of cocoon, cocoon weight, shell weight and SR%) and pest infestation (reduvid bug, canthecona bug and wasp) were recorded. The cocoon quality of cocoon showed decreasing trend in late brushing of tasar silkworm *viz.*, first date of brushing> second date of brushing > third date of brushing whereas pest infestations showed increasing trends in late brushing viz., first < second <third date of brushing respectively. In case of directions, cocoon quality showed deceasing trends viz, east > north > south > west direction whereas pest infestation showed increasing trend viz., east < north < south and < west direction respectively. Overall highest cocoon quality and lowest pest infestation was observed in first date of brushing in east direction whereas lowest cocoon quality and highest pest infestation was observed in third date of brushing in west direction except wasp infestation. Finally, it could be concluded that the first date of brushing in east direction might be efficient in terms of suppressing the major pest predator to some extent and enhance cocoon production in humid subtropical climate of Dumaka, Jharkhand. This simple practice would reduce the cost of silkworm protection, protect the environment and can be incorporated as a component of integrated pest management (IPM) in tasar culture.

Introduction

Tropical tasar silkworm, *Antherae amylitta* D (Lepidoptera:Saturniidae) is a commercially important insect and a valuable component of Asian non-mulberry silk industry. Forest dependent people rear its larvae on different forestry host plants twice or thrice in a year for small household income. It is a backbone for tribal development because about 1.25 lakh tribal families are associated with tasar culture in the country (Reddy *et.al.*, 2015). *A. mylitta* completes its life cycle twice or thrice in a year depending on the biotic and abiotic factors, and accordingly the race is recognised as bivoltine (BV) or trivoltine (TV).The distribution of tasar silkworm in the Indian sub-continent is wide ranging between 10° to

32°N latitude and 76° to 93°E longitudes and it experiences varied environmental conditions.

The cold blooded silkworm prefers 25+1°C temperature and relative humidity between 60-80%.The combination of temperature and humidity provide optimum condition for hatching of the eggs. The optimum temperature (28ºC – 30ºC) and humidity (75-86%), photoperiod (100-242 hours per month) with (11-12.50 hours) day length were found favourable for the life cycle performance of this species of tasar silkworms. The life cycle of the silkworms and growth of the host plants have been under the influence of temperature (Upadhyay and Mishra, 1991), Relative humidity (Mishra and Upadhyay, 1992), Photoperiod (Mishra and Upadhyay, 1992).

Brushing date is very important parameter in tasar silk production management decision, especially at region having environmental restrictions such as sooner and later coldness and severs. The date of brushing has a significant effect on numbers of cocoon production, cocoon weight, shell weight, silk ratio percentage and pest infestation in tasarculture. Therefore, the proper brushing date play an important role for optimum utilization of climatic factors such as temperature and humidity by silkworm and also consistent with the rearing period. Tasar silk production response not only to the inclement weather that delayed planting date, but also the times when the weather is favourable, it is important, therefore, selection of brushing date (optimum weather condition for silkworm growth and development) at regional level not only increase the quantity and quality of cocoon, but also reduced the pest infestation on tasar silkworm (Aharent and Caviness, 2004).

Cardinal directions of plant influence the insect flight, movement, and dispersal pattern. Most of insects move towards east west axis than south north axis (Bancroft, 2005). This dispersal habit of insects helps in formulating particular monitoring and recommendation methods for pest control. Insects on the basis of habitat requirement try to settle on branches that meet their optimum requirements for obtaining heat, sunshine and humidity. Monitoring from these sites helps in formulation of earlier pest management approaches. Selection of appropriate brushing direction on host plant viz., North, South, East, West for tasar silkworm rearing not only enhance the cocoon production but also make suppress environment for pest and predators attack on tasar silkworm.

Materials and Methods

The study was conducted during the years 2016 in the first crop rearing season of the Tasar silkworm *Antherae amylitta D*at Pilot Project Centre (PPC), Kathikund, Dumaka, Jharkhand located at 24°21′32″N 87°25′11″E,to study the "Impact of brushing date and direction on pest severity and cocoon production of tasar silkworm'. Randomized block design with two way factor was followed by three replicates. The climate of Dumka (Kathikund) was moderately extreme type. It becomes quite cold in winter and is sufficiently hot in summer. The climate may be divided into three main seasons. The summer from March to May and the Mansoon season from June to September. Winter season starts from October & ends in February. The district receives 80% of annual rainfall in summer season, July is the rainiest month. The average rain fall of the district is 1419.3mm per year. The variation in the rainfall, year to year, is very small. It comes under humid subtropical climate (Köppen climate classification *Cwa*).

The selected three date of brushing from first viz., B_1- first (16-07-2016), B_2- second (21-07-2016), B_3 - third (26-07-2016) and four

direction viz., N- north, S-south, E- east and W-west respectively. We download daily weather data viz., maximum temperature (Tmax), temperature minimum (Tmin), relative humidity morning (RHI), relative humidity evening (RHII) and rainfall (Rf) datafrom India Meteorological Department (IMD), New Delhi and it converted into weekly (fig-1).The Collection of pest/predators in Tasar silkworm viz., Reduviid bug, Canthecona and Wasp respectively collected with the help of gummy stick and sweep net/DFL/Direction. We asses cocoon quality viz., cocoon weight, shell weight and silk ratio % (SR %) respectively. We calculated SR% from cocoon by simple method(SR% = Shell weight/ Cocoon weight X 100)

Results and Discussion

Impact of date of brushing and direction on silkworm production

The impact of different date of brushing and directions on cocoon quantity (numbers of cocoon and cocoon weight) and quality (shell weight and SR %) in Tasar culture are given infigure number 2 and 3. Both date of brushing and directions showed highly significant (** - significant at 1 %) for cocoon weight, shell weight and SR% except numbers of cocoon harvested showed non-significantin direction. The highest numbers of cocoon (52) was observed in the treatment 3in first date of brushing of east direction whereas lowest numbers cocoon (25) was observed in treatment 12in third date of brushing of west direction. Similar trend was also observed with cocoon weight, shell weight and SR% in tasar silk production. First date of brushing showed higher numbers of cocoon quantity and quality in all direction as compare to second and third date of brushing. The decreasing trend was observed for cocoon quantity and quality during various date of brushing of tasar silkworm viz., first >second >third respectively in all directions. The delayed in date of brushing leading to decreases numbers of cocoons, cocoon weight, shell weight and SR%. Date of brushing has a great impact on the incidence of the pest which may be attributed to the difference in weather conditions which are favourable or unfavourable for pest on tasar silkworm. Early brushing of silkworm have less harbored with lowest pest population have the corresponding increase in the numbers of cocoon than the late brushing of Tasar silkworm. It might more radiation penetration and interception in east and north direction increased the host plant profile temperature and decreased humidity within the canopy and made the crop microenvironment unfavourable for pest. Finally, it could be concluded that the first date of brushing in east and north direction might be efficient in terms of suppressing the major pest. This simple practice would reduce the cost of crop protection, protect the environment and can be incorporated as a component of IPM in Tasar culture. Similar findings were also reported in agricultural crop in case of sowing date by different scientist (Chaudhary and Sachan, 1995, Ambulkar*et al.,* 2011, Prasad *et al.,* 2012). Fine-tune management of cocoon production by brushing date and direction is a good approach to enhance both cocoon production and economic benefit.

During experiment period we observed east direction showed higher cocoon (quantity and quality both) whereas west direction showed lower qualitative and quantitative cocoon in all date brushing. The decreasing trends was found for cocoon quality and quantity in various direction viz., east > north> south> west direction in all date of brushing. It might the east and north direction had higher intensive bright sunshine hour which make adverse environment for pest and predator

than south and west direction, therefore, the cocoon quality and quantity was higher in east and north direction as compare to south and west direction.

Cardinal directions of plant influence the insect flight, movement, and dispersal pattern. Most of insects move towards east west axis than south north axis (Bancroft, 2005). This dispersal habit of insects helps in formulating particular monitoring and recommendation methods for pest control. Insects on the basis of habitat requirement try to settle on branches that meet their optimum requirements for obtaining heat, sunshine and humidity. Monitoring from these sites helps in formulation of earlier pest management approaches and it reduces the costs which invest on pest management practices on tasar silkworm pest.

Impact of date of brushing and direction on silkworm protection

The impact of different brushing date and directions on pest infestation (reduvid bug, canthecona and wasp) on Tasar silkworm are given in figure number 3.Both date of brushing and directions showed highly significant (** - significant at 1 %,) for pest infestation. We modify the environmental condition with the help of different date of brushing and direction of silkworm larva during rearing period. Which date of brushing and direction is beneficial for silk production we adapt and which date of brushing and direction is responsible for outbreak of predators we ignore during first crop rearing at regional level. The lowest reduvid infestation (2) was found in treatment 3 (first date of brushing in east direction) whereas maximum (16) was observed in the treatment 12 (third date of brushing in west direction). Similar results also found with canthecona bug and wasp in tasar culture. The high pest population of reduvid bugs canthecona bug and wasp in the late brushing date (third brushing date) could be due to a build-up of insect population partly because of availability of food provided for development by the early brushing. First date of brushing showed minimum pest infestation in all direction as compare to second and third date of brushing. The decreasing trend was observed for pest infestation in various date of brushing of tasar silkworm viz., first date of brushing < second date of brushing < third date of brushing respectively.

Treatment Combinations

S.N.	Treatment	Sub – treat	Treatment combinations details
1	Brushing dates	Directions	**B_1 x N-** First date of brushing and North direction
2	B_1(I)	N (North)	**B_1 x S-** First date of brushing and South direction
3	B_2(II)	S (South)	**B_1 x E-** First date of brushing and East direction
4	B_3(III)	E (East)	**B_1 x W-** First date of brushing and West direction
5		W (West)	**B_2 x N-** Second date of brushing and North direction
6			**B_2 x S-** Second date of brushing and South direction
7			**B_2 x E-** Second date of brushing and East direction
8			**B_2 x W-** Second date of brushing and West direction
9			**B_3 x N-** Third date of brushing and North direction
10			**B_3 x S-** Third date of brushing and South direction
11			**B_3 x E-** Third date of brushing and East direction
12			**B_3 x W-** Third date of brushing and west direction

Fig.1 Weather data in standard meteorological weeks during silkworm rearming and PPC, Kathikund

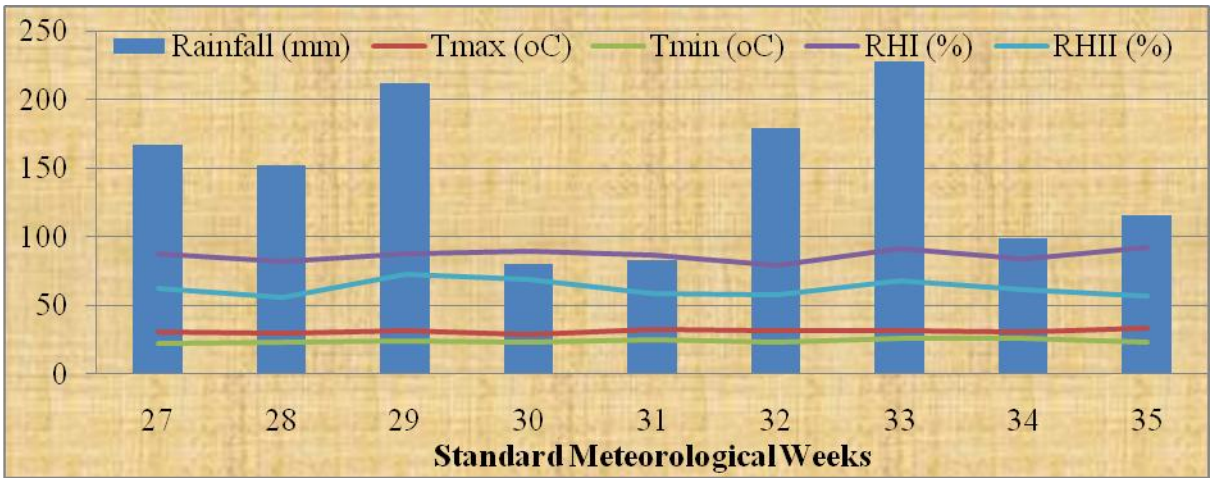


Fig.2 Effect of brushing date and direction on numbers of cocoon/DFL/Direction and cocoon weight gm/DFL/Direction

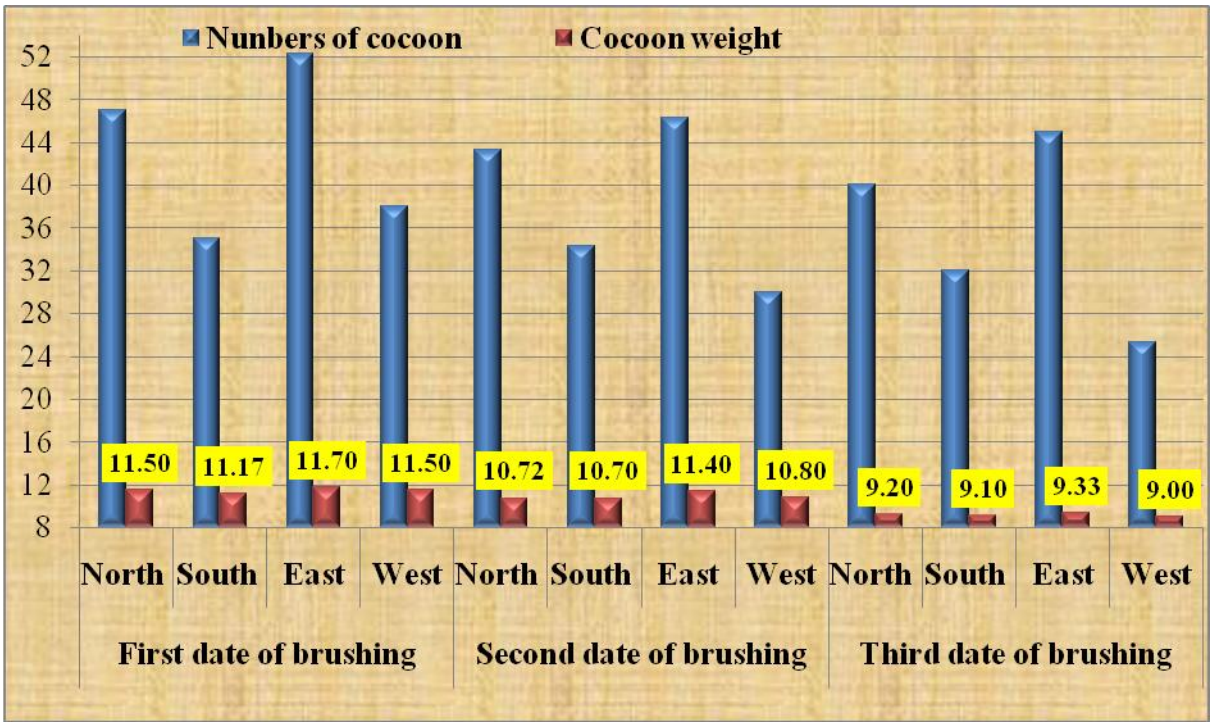


Fig.3 Effect of brushing date and direction on numbers of shell weight/DFL/Direction and SR%/DFL/Direction

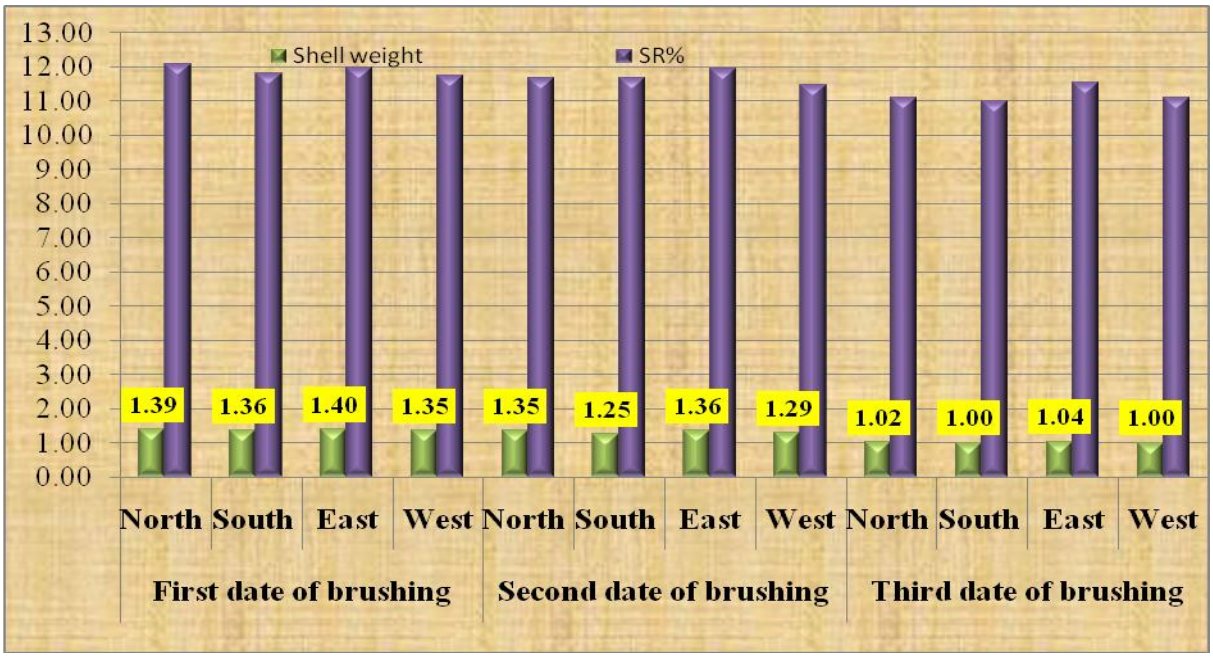
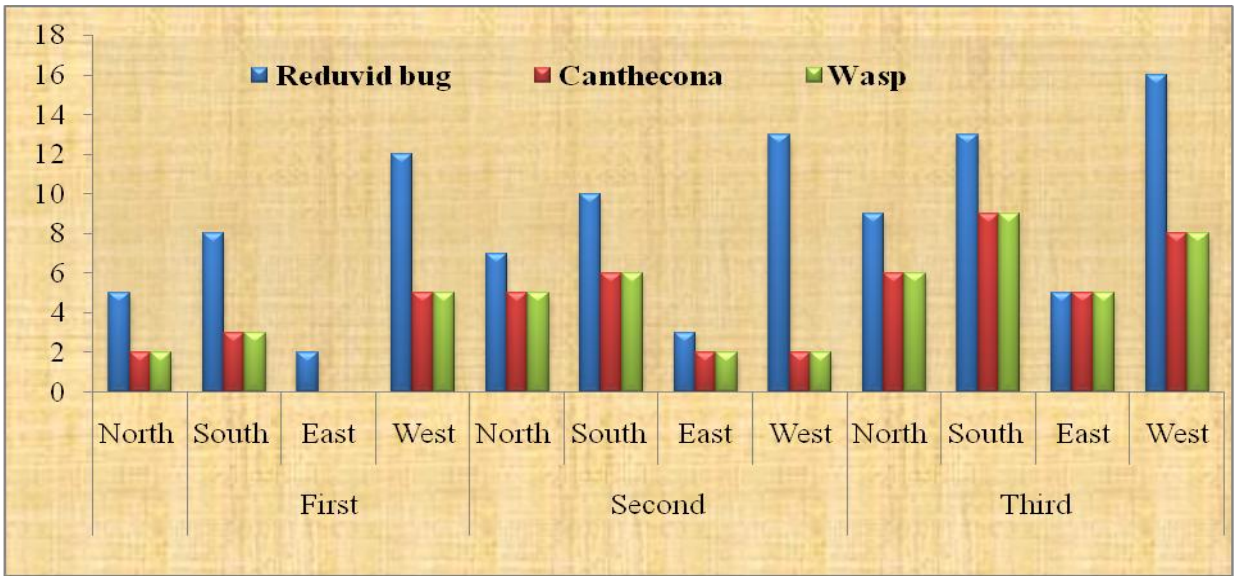


Fig.4 Effect of brushing date and direction on predator infestation in tasar silkworm



Similar results have been reported by Omoloye, *et al.,* 2015 for sucking bug in soybean crop. During experiment we observed east and north direction showed minimum pest infestation than west and south direction. The decreasing trends was found for reduvid bug, canthecon bug and wasp in various direction viz., east < north<south < west in all date of brushing.

Generally east and north direction showed low pest infestation, it might be east and north directions make suppress microenvironment for pest infestation whereas south and west direction make favourable microenvironment for pest infestation. Delay date of brushing (third date of brushing) showed high predators' infestation as compared to first date of brushing. Date of brushing has a great impact on the incidence of the predators which may be attributed to the difference in weather conditions which are favourable or unfavourable for predators on tasar silkworm.

Summary and Conclusion

The results of this study showed that brushing date and direction had significant positive effect on Tasar silk production and protection. So that the weather conditions of region and direction (first date of brushing and east direction) had the higher numbers of cocoon, cocoon weight, shell weight, SR% lower pest infestation in tasar culture at Dumka - Jharkhand. On the basis of results finding we suggested at regional level, they adapt first date of brushing in east direction for higher tasar silk production and low pest infestation.

References

Aharent, O.K. and Caviness, C.E. 2004. Natural crosspollination of 12 soybean cultivars in *Advance Crop Sci.* 34: 376- 378

Ambulkar, P. L., Saxena, A. K. and Dixit, H. 2011. Effect of date of sowing and irrigation level on the incidence of *Helicoverpaarmigera* (Hubner) on chickpea crop*International Journal of Plant Protection*4(2): 301-304

Bancroft, J. S., 2005. Dispersal and abundance of *Lygus hesperus* in field crop *Environ. Ent* ., 34: 1517-1523

Chaudhary, R. R. P. and Sachan, R. B 1995. Comparative efficacy and economics of some insecticides against gram pod borer, Helicoverpaarmigera (Hubner) in chickpea in western plain of Uttar Pradesh. *Bhartiya Krishi Anusandhan Patrika*. 10: 159-164

Mishra, A.B and Upadhyay, V.B 1992.Nutritional efficiency of bivoltine, *Bombyxmori* L larvae at higher regimes of relative humidity. *Journal of Advance Zoolog.* 13 (1 & 2):16-18

Omoloye, A.A., A.O. Joda& F.O. Tobih 2015.Effects of Planting Dates and Intra-Row Spacing on Field Infestation and Damage by Hemipteran Sucking Bugs on Soybean in Ibadan, Southwest Nigeria. *Journal of Agriculture and Environmental Sciences* June 2015, Vol. 4, No. 1, pp. 134-137.

Prasad, D., Bhan, C., Sharma, V. and Prasad, H 2012. Effect of various plant geometry on Chickpea (*Cicer arietinum)* under different dates of sowing: A Review. *J. Progressive Agriculture*. 3(2): 113-117

Reddy, P. M. Muniswamy, V.P. Gupta and G. Lokesh2015.Impact of trainers training programmes of integrated skill development scheme (isds) in tasar technologies, *Global Journal of Bio-Science and Biotechnology,* VOL.4 (1) 2015: 17-20 ISSN 2278 – 9103

Upadhyay,V.B and Mishra, A.B. 1991.Nutritional ability of bivoltine silkworm *Bombyx mori* L larvae at higher temperature regimes. *J. Adv. Zool*., 12 (1): 56-59.

How to cite this article:

Singh, J., A. Kumar, S. Mukherjee, G.P. Singh, S. Ray, K.S. Rawat and Sinha, A.K. 2017. Assessment of Brushing Date and Direction on Tasar Silkworm *Antheraea mylitta* D Production and Protection. *Int.J.Curr.Microbiol.App.Sci.* 6(10): 4853-4859.
doi: https://doi.org/10.20546/ijcmas.2017.610.453