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EFFECT OF SHELL WEIGHT ON EMERGENCE BEHAVIOUR IN DABA BIVOLTINE SEED COCOONS DURING SECOND GRAINAGE AT NARSAPUR IN TELANGANA

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ABSTRACT : Tasar Sericulture provides supplementary livelihood to 2.5 lakh poor families in rural and semi-urban areas. Seeds form the back-bone of Tasar sericulture. Any disruption in seed production cycle causes economic loss in form of seed production loss and increased seed production cost. Problem of high percentage of non-emergence in bivoltine seed cocoons during second grainage period was observed for many years at Narsapur in Telangana, thereby affecting quantum and economics of seed production adversely. A study therefore was carried out for 06 years from 2002 onwards to understand the cause of non-emergence behaviour. Results reveal that grainage losses due to non-emergence of bivoltine Tasar seed cocoons ranged from 16.66% to 45.83%. Pupal weight in emerged cocoons ranged from 9.1g to 10.3g, whereas in un-emerged cocoons average pupal weight was higher by 14.38% and it ranged from 10.6g to 11.7g. Shell weight in emerged cocoons ranged from 1.5g to 1.7g, whereas in un-emerged cocoons average shell weight was higher by 13.49% and it ranged from 1.75g to 1.9g. The present study reveals that higher nutritive content in pupae, as indicated by higher pupal weight, as well as thick shell in non-emergence of cocoons, coupled with high temperature during rearing of seed cocoons have some role to play in non-emergence.

Key words : Grainage, seed, cocoons, non-emergence, pupal weight, shell weight.

INTRODUCATION

The tropical Tasar silkworm, *Antheraea mylitta* Drury, a sericigenous wild insect, has own dictation on its life cycle stages (Dinesh Kumar *et al*, 2012). It produces Tasar silk of commercial importance at industry level. Tasar sericulture provides supplementary livelihood to 2.5 lakh poor families in rural and semi-urban areas. In parlance of sericulture, eggs of silkworm are called seeds as it is the basic material from which further generation is raised. Seeds form the back-bone of Tasar sericulture. Production and timely supply of quality silkworm seed is a pre requisite for the proper development and sustenance of silk industry (Singhvi and Sathyanarayana, 2014).

Tasar Seed production is a complex process involving number of steps. The integral parts of any Tasar seed production programme are (1) Tasar silkworm rearing (2) Grainage and (3) Moth examination for production of disease free seeds (Singhvi and Sathyanarayana, 2014). For grainage Tasar cocoons are selected and hung in grainage house, where the moth emerge from them and couple and such female moths are allowed to lay eggs in earthen cups for further processing. Any disruption in seed production cycle causes economic loss in form of seed production loss and increased seed production cost. At Basic Seed Multiplication and Training Centre, Narsapur problem of high percentage of non-emergence in bivoltine seed cocoons during second grainage period was observed for many years, thereby affecting quantum and economics of seed production adversely. Therefore, a study was carried out for 06 years from 2002 onwards to understand the cause of non-emergence behaviour.

MATERIALS AND METHODS

For obtaining bivoltine seed cocoons rearing were done at Narsapur during all the years from 2002 onwards under strict technical supervision following the methodology recommended by Central Tasar Research and Training Institute, Ranchi. Initial rearing (up to third stage) were conducted on sparsely located small bushes of Asan, *Terminalia tomentosa* W & A, and after third stage worms were transferred to denser natural forest plantation rich in Asan trees. All the rearing locations were situated at foot hills and soils contained good amount of soil moisture and well-decomposed organic matter. Leaves on the Tasar food plants were succulent. Generally the day length was over 12 hours during rearing period for all the years. Temperature and rainfall were recorded on daily basis during rearing period and average values presented in Table 2. Cocoons harvested from I crop rearing were brought to grainage house and hung in

Table 1 : Seed cocoon emergence, pupal weight and shell weight of cocoons during II grainage at Narsapur, Telangana.

Year	Cocoons consigned for grainage (No.)	Un-emerged cocoons		Pupal weight (g)		Shell weight (g)	
		Number	%	Emerged cocoons	Un-emerged cocoons	Emerged cocoons	Un-emerged cocoons
2002	56772	17680	31.14	10.1	11.7	1.7	1.9
2003	86972	20230	23.26	9.1	10.6	1.5	1.75
2004	65475	24805	37.88	10.3	11.9	1.65	1.9
2005	145700	24285	16.66	10.3	11.3	1.65	1.85
2006	48054	18609	38.72	10.1	11.6	1.64	1.89
2007	67463	30921	45.83	10.2	11.6	1.64	1.84
			Average	10.01	11.45	1.63	1.85

Table 2 : Temperature and rainfall during rearing period, July to September, of year 2002- 2007.

Year	Temperature °C		Rainfall	
	Minimum	Maximum	Quantum (mm)	Days (No.)
2002	23-24	29-32	104	18
2003	23-24	29-30	350	12
2004	22-27	39-39	469	31
2005	24-26	31-32	1076	48
2006	22-28	32-37	940.6	46
2007	22-26	28-34	815	44

grainage house for grainage operation, technically termed as second grainage, following standard protocol (Jolly *et al*, 1979; Kapila *et al*, 1992). Optimum temperature and humidity were maintained throughout grainage operation from pupation to emergence. Moth emergence was recorded on daily basis. Shell weight of emerged and non-emerged cocoons was recorded. Non-emerged live cocoons were allowed to preserve in grainage house and cut open to make observation at regular intervals.

RESULTS AND DISCUSSION

Perusal of data in table 1 reveals that losses during II grainage period in form of un-emerged cocoons, was lowest during 2005 at 16.66% and highest during 2007 at 45.83%. Pupal weight in emerged cocoons ranged from 9.1g to 10.3g, whereas in un-emerged cocoons average pupal weight was higher by 14.38% and it ranged from 10.6g to 11.7g. Shell weight in emerged cocoons ranged from 1.5g to 1.7g, whereas in un-emerged cocoons average shell weight was higher by 13.49% and it ranged from 1.75g to 1.9g. For the production of quality seed during II grainage Khanna *et al* (2009) have recommended standard shell weight for bivoltine Tasar seed cocoon as 1.6g, however they have not indicated any upper limit. Perusal of temperature and rainfall data (table 2) and percentage of un-emerged cocoons reveal that whenever the maximum temperature was higher than 32°C during rearing, the non-emergence percentage was higher.

Cutting & opening of un-emerged cocoons revealed that pupae were alive and healthy but no metamorphosis to moth was seen. In the subsequent year moths emerged from these cocoons as erratic emergence. This indicates that pupae in such un-emerged cocoons bypassed the normal emergence season and entered in diapause. Results of present study reveal that higher pupal weight and thick cocoon shell have some role to play in non-emergence of cocoons. High temperature during rearing of seed cocoons may also play some role. However, detailed studies are required to conclude the role of soil and Tasar silkworm nutrition on pupal and shell weight and their impact on cocoon emergence. Effect of increased temperature during first rearing on non-emergence behaviour of bivoltine seed cocoons of Narsapur area also needs through investigation. Studies in this direction are being taken up.

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