Table 1 *Effect of varying bulb-cuts on seed yield and its attributes of onion variety Pusa Red*

Cut treatment (C)	Plant height (cm)	Number of scapes per plant	Number of umbels per plant	Number of umbels per plot	Seed weight per plant (g)	Seed weight per plot (g)	Seed weight per hectare (kg)	Net profit per hectare (Rs.)
C_1 (whole bulb)	97.84	7.7	7.65^{a}	385.50^{ab}	13.25^{ab}	692.5^{a}	512.96^{a}	9745.87^{a}
C_2 ($\frac{1}{2}$ Vertical cut)	94.43	5.9	5.25^{bc}	306.25^{c}	10.50^{b}	592.5^{b}	438.88^{b}	9023.65^{a}
C_3 ($\frac{1}{4}$ Vertical cut	92.53	5.8	4.70^{c}	170.00	10.0^{b}	348.75	258.33	4356.97
C_4 ($\frac{1}{2}$ transverse cut	93.82	8.2	8.50^{a}	399.50^{a}	15.25^{a}	710.0^{a}	525.92^{a}	10137.45^{a}
C_5 ($\frac{1}{4}$ transverse cut	99.49	7.2	7.35^{ab}	399.50^{bc}	11.75^{a}	642.5^{ab}	475.92^{ab}	8634.67^{a}
Significant		–	*	**	**	**	**	**
C.D. at $P = 0.05$		NS	2.28	56.96	3.67	79.61	58.97	1768.90

(a), (b), (c) = Mean followed by common letter did not differ significantly at $P = 0.05$; * = Significant at $P = 0.05$; ** = Significant at $P = 0.01$; NS = Non significant

transverse-cut, as well as in $\frac{1}{4}$ transverse-cut and $\frac{1}{2}$ vertical-cut.

Greater number of umbels per plant observed in the treatments of transverse-cut and in whole bulb may be due to the greater number of scapes recorded in these treatments as compared to vertical-cut treatments.

Significant variation in the weight of seed per plant, per plot and per hectare was observed under different treatments. Maximum seed weight per plant, per plot and per hectare was recorded in $\frac{1}{2}$ transverse-cut which was significantly better than the vertical cuts but it did not differ significantly from whole bulb and quarter transverse-cut treatment. Although vertical-cut treatments did not differ significantly from each other as regards seed weight per plant, the seed weight per plot and per hectare was significantly greater in $\frac{1}{2}$ vertical-cut treatment than $\frac{1}{4}$ vertical cut. However, both these characters were not found significant in $\frac{1}{2}$ vertical-cut and $\frac{1}{4}$ transverse-cut treatment.

The present results for seed yield in $\frac{1}{2}$ transverse-cut and whole bulb agree with the findings of Singh *et al*[1]. The maximum seed yield obtained with $\frac{1}{2}$ transverse-cut in this study also agrees closely with the results of Shrivastava and Adhikari [2].

Economics of the various treatments indicates that maximum profits were obtained with $\frac{1}{2}$ transverse-cut-plantings. However, 50% of the initial cost of bulbs can be saved by use of bulbs cut vertically in two equal pieces for planting without any marked loss in the net profit.

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1. Singh, J. R., Shrivastava, R. P. and Tiwari, J., *Sci. Cult.*, 1965, **31**, 144.
2. Shrivastava, R. P. and Adhikari, B. S., *Punjab Hortic. J.*, 1970, **10**, 276.

SPINNING APPARATUS OF SILK WORM LARVAE *BOMBYX MORI* L THE SPINNERET

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SILK is the yarn of life extruded in continuous filamentous form by the silk worms. The solid bave is spun by the drawing action of the spinneret caused by the movement of the head of the larvae[1-3].

Bivoltine silk worms (NB_4D_2) reared on the mulberry leaves were utilized for the present study. The spinneret along with labium and anterior silk glands were dissected out. Whole mounts were prepared on a cavity slide and detailed morphological study was carried out using a Leitz microscope. A calibrated occular micrometer was used for the measurement.

The head of *Bombyx mori* larvae is hypognathous.

The labium is situated on the ventral side of the head and has a pair of labial palps. The hypopharynx and the prementum are united in a median lobe. This is supported by the postmentum and the maxillary stipites. The spinneret is situated on the hypopharyngeal premental lobe, on the proximal side of the labium, between the two labial palps[2-5] (figure 1). Since the spinneret is supported by sclerotic bars of the maxillary stipites and articulated with sides of prementum, there is provision for the spinneret to have free movement up and down, posterior and anterior[3].

The spinneret is a retractile tubular structure, conical in shape and bluntly pointed at the apex. The base of the spinneret shows a sclerotized ring-like structure (figure 2). On the ventral side of the spinneret three sclerotized bars can be observed—one at the middle and two on lateral sides. The middle bar is the longest and measures around 690 μm in length. Towards the posterior, the middle bar increases in width (from 40 to 110 μm). The lateral bars are 600 μm in length and slightly curved outwardly at the centre. During spinning the bars appear deep brown in colour[4].

The ducts of the silk glands of either side run anteriorly and unite together to form a common tube which opens outside through the spinneret. The opening of the spinneret is 170 μm wide. The total length of the spinneret is around 700 μm with a basal width of 420 μm.

From the above observation it can be concluded that the spinneret is protective, supportive and directive in function.

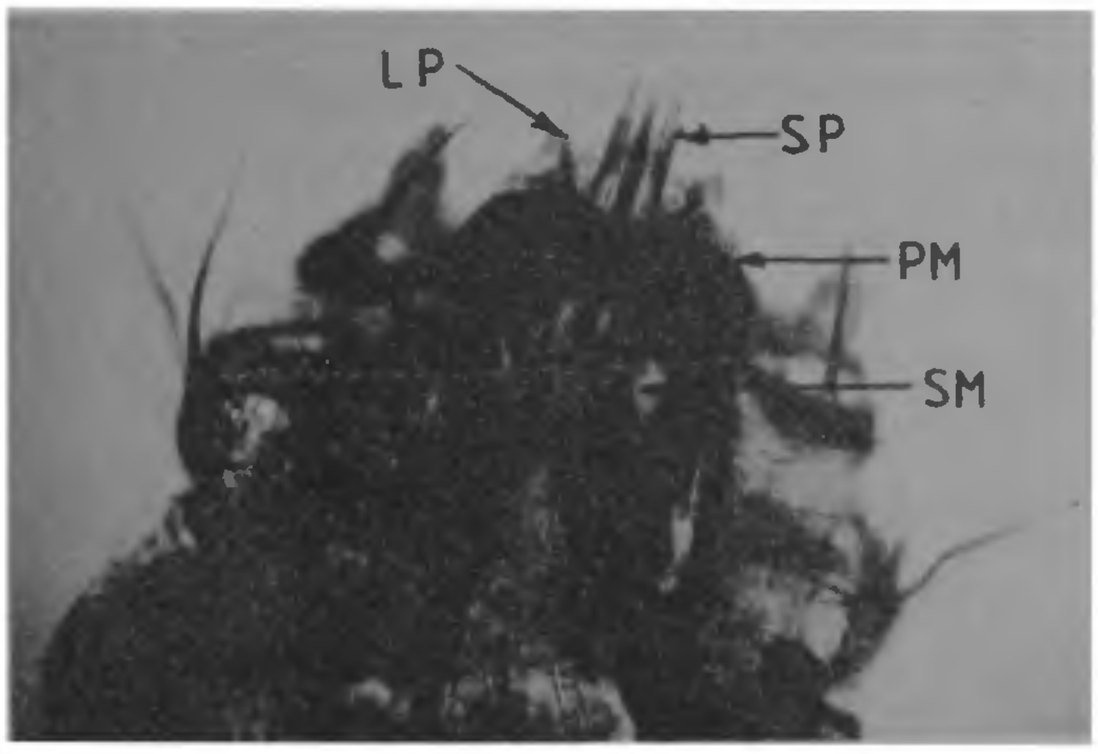

Figure 1. Anterior head region showing spinneret. LP-Labial Palpe; PM-prementum; SM submentum; SP-spinneret.

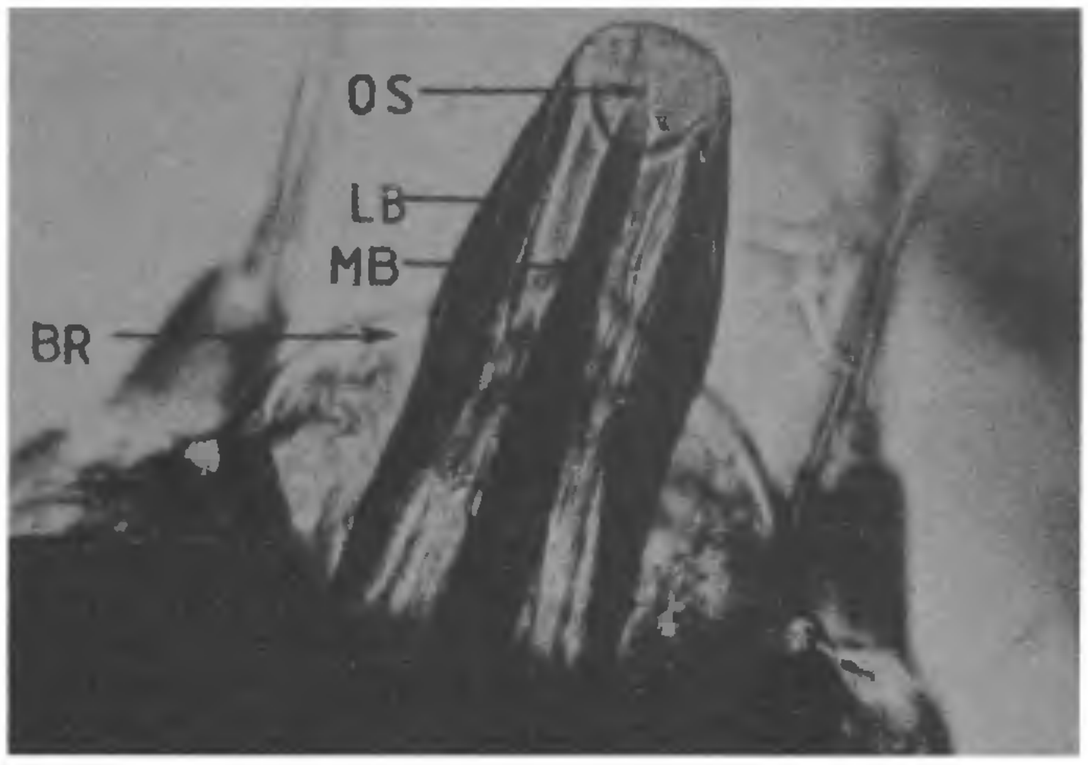

Figure 2. Ventral view of spinneret. BR-Basal ring; LB-Lateral bar; MB-Middle bar; OS-Opening of spinneret.

The soft silk gland duct opens outside through the spinneret, which is formed of harder tissue. So the spinneret behaves as a protective organ. The sclerotized bars on the spinneret provide mechanical rigidity to bring out the silk at the time of spinning. During spinning when the spinneret touches anything, silk adheres to it and the head movement of the larvae assists in drawing out the silk fibre. The line of spinning is directed by the spinneret.

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1. Katsumata, F., *Text book of tropical sericulture*, Japan Overseas Co-operation Volunteers, p. 594.
2. Richards, O. W. and Davies, R. G., *Imms-General text book of entomology*, Chapman and Hall, London, 1977, p. 1353.
3. Snodgrass, R. E., *Principles of insect morphology*, McGraw Hill, New York and London, 1935, p. 667.
4. Joy, O., *Pathophysiological details on the non-spinning silk worms*, Proceedings of Third Oriental Entomology Symposium, Trivandrum, India, 1984.
5. Mathur, L. M. L., *Proc. Nat. Acad. India*, 1969, **B39**, 292.