2. Lucas, A. M. and Jamroz, C., *Atlas of avian haematology, U.S.D.A., Washington D.C. Agricultural Monograph 25*, Indian Edition, Oxford and IBH Publishing Co., New Delhi, 1974, p. 230.
3. Sharma, F. L. and Seetharaman, C., *Indian J. Vet. Sci. Anim. Husb.*, 1950, **20**, 203.
4. Sekhar, P. C. Ph.D. thesis, Osmania University, Hyderabad, 1982, p. 253.

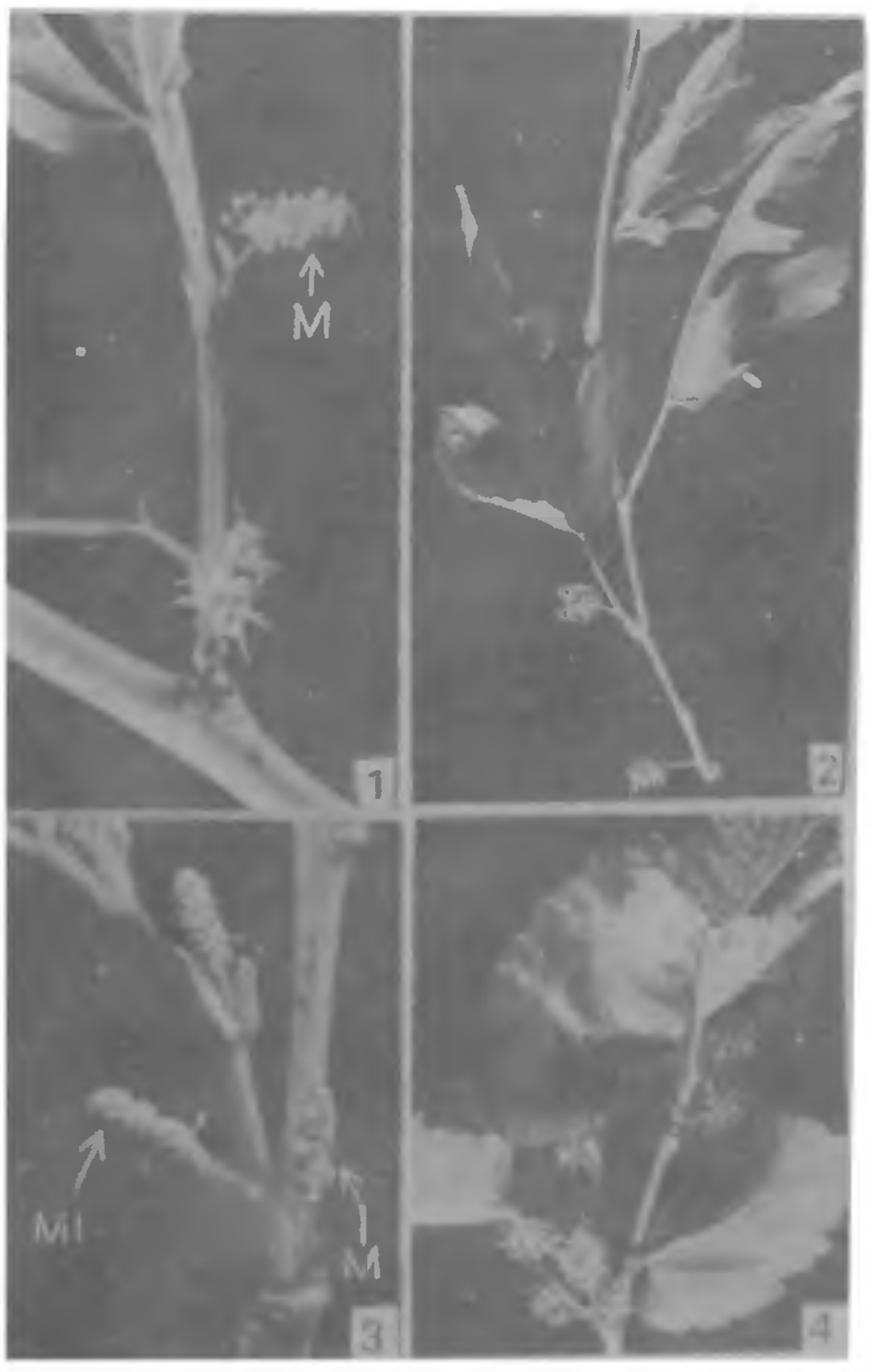
MODIFICATION OF SEX EXPRESSION IN MULBERRY (*M. ALBA* AND *M. INDICA*) BY SILVER THIOSULPHATE

S. RAVINDRAN, S. B. DANDIN, R. KUMAR and M. S. JOLLY
Mulberry Breeding and Genetics Laboratory, Central Sericultural Research and Training Institute, Mysore 570 008, India.

MODIFICATION of sex expression in mulberry (*Morus* sp) has been reported[1–4] by several workers using growth regulators, colchicine and certain ionic chemicals. The present paper deals with the modification of sex in two female cultivar of mulberry viz Bilidevalaya (*M. indica* L) and Kanva-2 (*M. alba* L) using silver thiosulphate (STS) for the first time.

Bilidevalaya and Kanva-2 varieties bear only female flowers. Two-year-old potted plants (having 6–8 branches per plant) raised from stem cuttings were treated with aqueous solution of STS in one concentration (1000 ppm). STS solution was prepared just before use by adding excess (8:1) STS to silver nitrate so that equilibrium reaction was shifted towards Ag $(S_2O_3)_2^{3-}$ complex. Tween-20 (0.01%) was used as a wetting agent. The aqueous solution was applied as foliar spray till the point of run-off. There were two replictions of 6 plants each for all the treatments including control which received aqueous spray containing only tween-20. Spraying was done daily in the cool hours of the morning at 9.00 AM for 5 consecutive days. Plants were grown under outdoor conditions and were defoliated on seventh day after last spraying to induce bud sprouting.

Flowers were induced after 15 days of last spraying in both the varieties. However, simultaneous initiation of flowers was observed in control as well as treated plants of both the varieties. The size of the inflorescence was smaller with longer peduncle compared to the control. Flower arrangement was also sparce. On the contrary the parental inflorescences were compact with dense flower arrangement. Inflorescences matured earlier than the normal ones in treated plants. The frequency of occurrence of male inflorescences in var Bilidevalaya was lower (37.5%) as compared to female inflorescences (62.5%) and there were no mixed type of inflorescences (figures 1 and 2). On the other hand, the production of male inflorescences (23.3%) was lower than that of parental type (50.04%) in var Kanva-2. However, mixed type of



Figures 1–4. Control and STS-treated flowering branches. **1.** Induced male inflorescence in Bilidevalaya; **2.** Control branch of Bilidevalaya bearing female inflorescences; **3.** Induced male and mixed inflorescence in Kanva-2; and **4.** Control branch of Kanva-2 bearing female inflorescences. (M-Male inflorescence; MI-Mixed inflorescence)

inflorescence (26.66%) consisting of male and female flowers in the same catkin were also observed (figures 3 and 4). There were no bisexual flowers in the mixed inflorescence where male and female flowers were found on the same inflorescence. The pollen fertility in induced male flowers was determined by staining with 0.5% acetocarmine and Alexander's[5] staining method and was 65% and 61% in var Bilidevalaya and Kanva–2 respectively. Female inflorescences of control plants dusted with these pollen grains formed normal seeds confirming the fertility of the pollen from induced male flowers.

Silver in cationic form was more effective in induction of male flowers as evident from the earlier report in *Morus alba* var Kanva-2 than the anionic form. The present investigation clearly demonstrates that STS also triggers male sex expression in female plants of *M. alba* and *M. indica* probably by blocking the action of ethylene[6,7]. Chemical induction of male flowers in female cultivars can be used in reciprocal crosses and for raising the pure lines. Hence this technique will be highly rewarding in mulberry improvement programme.

11 June 1986; Revised 11 August 1986

1. Jaiswal, V. S. and Kumar, A., *Indian J. Exp. Biol.*, 1980b, **18**, 911.
2. Ogure, M., Harashima, N., Naganuma, K. and Matsushima, M., *J. Seric. Sci. Jpn.*, 1980a, **49**, 335.
3. Dwivedi, N. K., Sikdar, A. K., Dandin, S. B. and Sastry, C. R., *Curr. Sci.*, 1984, **53**, 1036.
4. Kumar, R., Dandin, S. B. and Ravindran, S., *Indian J. Exp. Biol.*, 1985, **23**, 288.
5. Alexander, M. P., *Stain Technol.*, 1969, 44, 117.
6. Beyer, E. M. *Hortic. Sci.*, 1976, **11**, 195.
7. Mohan Ram, H. Y. and Sett, R., *Theor. Appl. Genet.*, 1982, **62**, 369.

COLOUR POLYMORPHISM IN MUGA SILKMOTH *ANTHERAEA ASSAMA* WESTWOOD

K. THANGAVELU*, A. K. BHAGOWATI and A. K. CHAKRABORTY

Regional Muga Research Station, Mirza 781 125, India.
** Present address: Regional Sericultural Research Station, No. 17, Anai Road, Salem 636 001, India.*

Colour polymorphism in insects has been attributed to a complex mixture of pigments[1], environmental, hormonal and genetical factors[2, 3]. Colour polymorphism has been previously reported in larval stages of all the four silkworm species viz *Bombyx mori* L[4], *Antheraea mylitta* Drury[5, 6], *Philosamia ricini* Hutt[1, 7] and *Antheraea assama* West[8]. However, the occurrence of colour morphs in the moth stage of *A. assama* has not been reported so far.

In a recent survey in the Jorhat District of Assam bordering the foot hills of Naga Hills (94° 46'E and 26° 9'N) a total of 127 wild muga cocoons were collected from *Machilus bombycina* King, the principal food plant of muga silkworm during February-March 1984. On emergence, the moths exhibited distinct colour variation and the population was a mixed type, 19 moths (12♂ and 7♀) were black, 5 (2♂ and 3♀) were intermediate and the rest (55♂ and 58♀) were brown (normal). The mixed population of moths was segregated based on colour pattern and inbred to isolate the pure lines. Since March 1984 five rearings were conducted until February 1985. The black colour of the moth appears to be a recessive character against brown colour (normal). The black moths do not exhibit any other morphological variation except in colour pattern and slightly larger wing expanse, body length and larval weight. The data recorded on morphological characters of the moth, larval weight, oviposition and fertilization rate and shell-ratio (table 1) indicate some differences among the black and brown moths.

The weight of the fifth instar larva, oviposition and fertilization rate and shell-ratio of the black and brown moths were compared and statistically analyzed. The weight of both male and female larvae and fertilization rate vary but not significantly. However, the rate of oviposition of the black moth is significantly higher ($P < 0.05\%$) than that of the brown moth. Also the shell-ratio of male cocoons of the black moth is significantly higher ($P < 0.01$) than the shell-ratio of the male cocoons of the brown