

cuts were analysed for crude protein<sup>2</sup> ( $N\% \times 6.25$ ), Ca and P<sup>3</sup>. The mean values for crude protein, calcium, phosphorus for five important varieties are given in Table I.

TABLE I

Variety	Crude protein %	Calcium %	Phosphorus %
Anand-1	23.2	2.46	0.22
Anand-2	21.6	2.36	0.22
Sirsa-9	22.8	2.10	0.23
Hissar	22.8	2.18	0.22
Coimbatore	21.3	2.28	0.23

Dept. of Soil Science  
and Agricultural  
Chemistry,  
Tamil Nadu Agricultural  
University, Coimbatore-3,  
February 19, 1976.

P. MUTHUSWAMY.  
M. GOVINDASWAMY.  
K. K. KRISHNAMOORTHY.

1. Gonzalez, G. and Trevino, J., *Herbage Abstr.*, 1975, 45, 18.
2. Humphries, E. C., *Modern Methods of Plant Analysis*, Springer-Verlag, Berlin, 1956, 1, 468.
3. Jackson, M. L., *Soil Chemical Analysis*, Prentice Hall of India (Pvt.) Ltd., New Delhi, 1973.
4. Lee, C. T. and Smith, D., *Agron. J.*, 1972, 64, 326.
5. Polidori, F., D'urso, G., Quila, D. A. S. and Sarro, F., *Herbage Abstr.*, 1973, 43, 145.

TABLE II

Month	2	3	4	5	6	7	8	9	C.D. at 5%
Crude protein %	21.5	23.9	24.3	23.3	23.2	23.4	17.6	20.6	1.52
Calcium %	2.34	2.31	2.26	2.67	2.45	2.05	1.90	1.80	0.18
Phosphorus %	0.20	0.22	0.25	0.22	0.25	0.25	0.18	0.17	0.019

The different varieties did not differ in their protein and phosphorus contents. However they differed in their Ca content (C. D. = 0.24 at 5%).

The mean values of fifteen lucerne varieties for crude protein, calcium and phosphorus content on dry weight basis at different cutting intervals are presented in Table II.

All the three constituents differed significantly with the cutting intervals. The maximum crude protein was recorded in the cutting taken at fourth month followed by that of the third month. The crude protein content decreased from the fourth month onwards. Earlier investigators<sup>1,4</sup> observed a general decrease in the protein content with the maturity of the crop but the period of maximum concentration of crude protein was not reported. The calcium and phosphorus contents were maximum during fifth and the fourth months respectively and decreased later on<sup>5</sup>. It could therefore be concluded that the lucerne varieties had the maximum concentration of crude protein, calcium and phosphorus in the fourth and fifth month cuttings.

The authors are thankful to the Head of the Department of Agricultural Botany and to the Botanist for the help rendered during this study.

**SOME PARASITES OF CABBAGE WORM,  
*PIERIS BRASSICAE* LINN.  
(LEPIDOPTERA : PIERIDAE) FROM  
(KULU VALLEY), HIMACHAL PRADESH**

THE cabbage worm, *Pieris brassicae* Linn., is a serious pest of cruciferous crops and is widely distributed in many parts of the world. In India, it causes appreciable damage in Punjab, Himachal Pradesh, Uttar Pradesh, Bihar, Bengal and Assam. At Vegetable Research Station, Katrain, Kulu Valley, a collection of eggs, larvae and pupae of *P. brassicae* was made during different months from 1972 to 1974 and following parasites were recovered in the laboratory.

No egg parasite was found. Among the larval parasites, *Apanteles glomeratus* L. was very common, attacking about 13% to 25% of the larvae in May and about 30% in June. *Tetrastichus sokolowskii* Kurdj is a new record on *P. brassicae*. But, this parasite has been previously recorded on diamond back moth *Plutella xylostella* L.<sup>1,2,10</sup> from America and India. Its parasitization during May and June was between 7% and 10%. The percentage parasitization of *Apanteles* sp., *Ecphoropsis perdistinctus* Vier and *Bracon* sp. was 4%, 1.3% and 2.5%, respectively.

TABLE I

Parasites recovered in the laboratory on the eggs, larvae and pupae of *Pieris brassicae* Linn.

Order/Family	Parasites	Stage attacked	Parasitism (%)
<i>Hymenoptera</i>			
Braconidae	1. <i>Apanteles</i> sp.	Caterpillar	4
	2. <i>A. glomeratus</i> L.	"	13-30
	3. <i>Bracon</i> sp.	"	2.5
Chalcididae	4. <i>Brachymeria</i> sp.	Pupa	2.3
Eulophidae	5. <i>Tetrastichus sokolowskii</i> Kurdj.	Caterpillar	7-10
Ichneumonidae	6. <i>Nythobia</i> ( <i>Diadegma</i> ) sp.	Pupa	2-4.5
	7. <i>Ecphoropsis perdistinctus</i> Vier.	Caterpillar	1.3
Pteromalidae	8. <i>Pteromalus puparum</i> L.	Pupa	20-35

The pupal parasite, *Pteromalus puparum* L., was the most common and it attacked about 20% to 35% pupae. The other two pupal parasites, viz., *Nythobia* (*Diadegma*) sp. and *Brachymeria* sp. are the first records on *P. brassicae* from India. Some species of the genus *Nythobia* (*Diadegma*) have been recorded on other crop pests<sup>3,5,7-9</sup>. *Nythobia* (*Diadegma*) sp. is a black coloured ichneumonid parasite. The front and middle leg segments are light yellow, hind coxae and tarsi black and rest of the leg light yellow. It is about 4 mm in length and 0.9 mm in width across the head. The parasitization by *Nythobia* (*Diadegma*) sp. was only about 2% to 4.5%. Some of the species of *Brachymeria* have been recorded on other crop pests, e.g., *Brachymeria bicolorata* on *Earias* sp. in Pakistan<sup>4</sup>, *Brachymeria phya* on *Plutella xylostella* L. in Canada<sup>11</sup>, *Brachymeria* sp. on *Plutella xylostella* L. in India<sup>6</sup> and *Brachymeria femorata* on *Pieris brassicae* L. in Bulgaria<sup>3</sup>. Its parasitism was found at 2.3% only.

Authors wish to thank Dr. N. C. Pant, Head of the Division of Entomology, I.A.R.I., New Delhi, for encouragement and facilities for the work.

Thanks are also due to the Director, Commonwealth Institute of Entomology, London; Entomologist-in-charge, Commonwealth Institute of

Biological Control, Bangalore, and Dr. S. I. Farooqi, Division of Entomology, I.A.R.I., New Delhi, for identification of various parasites.

Ind. Agri. Res. Inst.,  
Regional Station, Katrain,  
Kulu Valley, H.P., February 6, 1976.

O. P. LAL.

J. CHANDRA.

1. Cherian, M. C. and Basheer, M., *Proc. Indian Acad. Sci.*, 1939, 1 B, 87.
2. Harcourt, D. G., *Canad. Ent.*, 1960, 94, 419.
3. Kaitazov, A., *Rast. Zashit.*, 1963, 11, 20.
4. Khokhar, K. F., Qudri, M. A. H. and Ahmed, M., *Pakistan J. Sci. Ind. Res.*, 1971, 14, 261.
5. Ootmann, E. R. and Plantner, G. R., *Hilgardia*, 1969, 40, 1.
6. Patel, V. C. and Patel, H. K., *Indian J. Ent.*, 1968, 30, 86.
7. Rao, V. P. and Nair, K. R., *Tech. Bull. Commonwealth Inst. Biol. Control*, 1967, 9, 73.
8. Rojas, P. S., *Agriculture Tec.*, 1965, 25, 39.
9. Tikar, D. T. and Thakre, K. R., *Indian J. Ent.*, 1962, 23, 116.
10. Ullyett, G. C., *Ent. Mem-Dep. Agric. S. Afr.*, 1947, 2, 77.
11. Yarrow, W. H. T., *Queen. J. Agril. An. Sci.*, 1970, 27, 321.

#### A NOTE ON THE CYTOLOGY OF *BOERHAAVIA REPANDA* WILLD.

THE present study deals with the karyomorphology and meiosis of *B. repanda* Willd. The material was collected locally and grown in pots. For somatic preparations, excised root tips were pretreated with 8-hydroxyquinoline for about 2½ hrs at 10° to 15° C, and stained according to Feulgen's schedule. Permanent slides were made by passing through acetic acid butanol series and mounted in euparal. Meiotic studies were made by fixing the flower buds at different stages of development in 1:3 acetic alcohol for 24 hrs. Smear preparations were made in 1% propionocarmine.

Karyotype description is made following Levan *et al.*<sup>2</sup>. For determining the type of chromosome the centromeric index ( $r = l/s$ ), where 'r' as the arm ratio, 'l' as the length of the long arm, and 's' as the length of the short arm is taken into account. The diploid chromosome number of this plant is found to be  $2n = 42$  (Figs. 1, 2). The chromosomes fall in a series of close gradations. However, a pair of long submedian chromosomes ( $2.36 \mu$ ) is distinguishable in the karyotype. There are five pairs of chromosomes with median centromeres, and all the rest of the chromosomes show submedian centromeres. The chromosome-measurements and classification are given in Table I.