stitial membrane, which is at least partly constituted by the remnants of the basement membrane of the maternal endothelium, and a layer of enucleate eosinophilic cytoplasm, which is all that remains of the syncytiotrophoblast. Thus the placenta of *Pipistrellus mimus mimus* should be designated as "haemodichorial" according to the classification of haemochorial placentae of Enders (1965).

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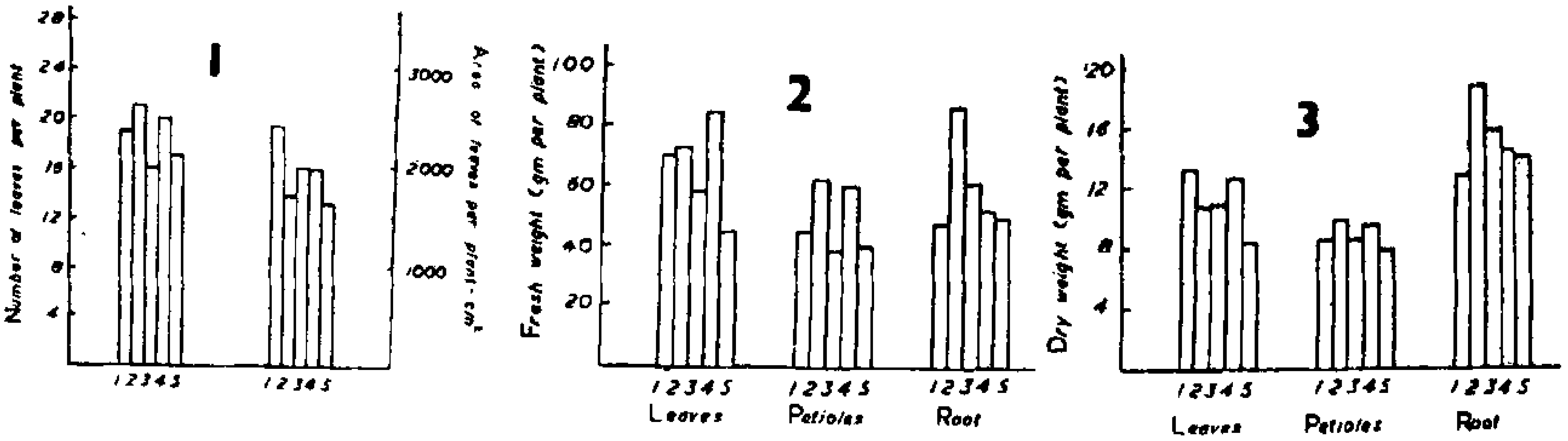
EFFECT OF FOLIAR APPLICATION WITH SOME MICROELEMENTS ON GROWTH AND SOME PHYSICO-CHEMICAL PROPERTIES OF SUGAR-BEET GROWN IN WINTER SEASON

FOLIAR spray with certain microelements were reported to increase cold-hardening of plants[1] by lowering the respiratory quotient and causing an accumulation of organic acids[2] as well as inducing changes in the physico-chemical properties of plant cell protoplasm biocolloids.[3] Therefore, the aim of this work was to investigate the effect of foliar application with Zn, Mn, Cu and B on the vegetative growth and sugar content of Beet plant as well as on the osmotic pressure and electrical conductivity of leaf extract during the winter season.

Fruits of *Beta vulgaris* L. (Sugar-beet) variety "A.J. Poly 2" were planted on September 9, 1970 in pots No. 30 filled with 12 kg loamy soil. After complete germination, plants were thinned and one plant per pot was left to grow. The pots were fertilized at a rate of 0·15 g N, 0·10 g P_2O_5 and 0·22 K per kg soil as calcium nitrate, superphosphate and potassium sulphate. After 40 days from sowing, each group of 10 pots were sprayed with 0·5 ml of one of the following solutions: 1—Distilled water as control; 2—$MnSO_4$; 0·05%, 3—$ZnSO_4$; 0·05%, 4—$CuSO_4$; 0·005% and 5—H_3BO_3; 0·05%.

Samples of leaves, petioles and roots of both treated and control plants were collected after five months from sowing. Fresh and dry weights of the different plant parts were determined. Leaf area per plant was measured by the disc method[4]. In addition, number of leaves per plant were recorded. The osmotic pressure was determined for the prepared fresh leaves extract according to Loomis and Shull[5] as well as the electrical conductivity was determined according to Richards[6]. The total soluble carbohydrate content (mg glucose/gm dry weight) of different plant parts was determined using the anthrone method[7].

Vegetative growth.—Figure 1 shows that foliar application of Mn, Zn and B to sugar-beet plants generally increased both the number and the area of leaves per plant, with varying degree according to the element applied. From Figs. 2 and 3, it could be concluded that the foliar application of either Zn or B seemed to be the most efficient for increasing the fresh and dry weights of the roots and leaves of sugar-beet plant.



FIGS. 1-3. Fig. 1. Effect of foliar application with microelements on the number and area of leaves of sugar-beet plants. (1) $MnSO_4$ 0·05%; (2) $ZnSO_4$, 0·05%; (3) $CuSO_4$, 0·005%; (4) H_3BO_3, 0·05%; (5) control. Fig. 2. Effect of foliar application with microelements on the fresh weight of sugar-beet plant. (1–5, *see* Fig. 1.) Fig. 3. Effect of foliar application with microelements on the dry matter content of sugar-beet plant. (1-5, *see* Fig. 1.)

Total soluble carbohydrate content.—The data in Table I show that the total soluble carbohydrate content in the root of plants sprayed with Zn was markedly increased as compared with their control, whereas other treatments were without effect. In the petioles, the total soluble carbohydrate content was not

Table I

Effect of foliar application with certain micro-elements on total soluble carbohydrate content in sugar-beet plants as well as on osmotic pressure (O.P.) and eletrical conductivity (E.C.) of leaf extract

Spraying treatment	Total soluble carbohydrate (mg glucose/g dry weight)			O.P. (atmos-phere)	E.C. (mmhos/cm 25° C)
	Root	Petiole	Leaves		
Control	268·6	228·3	165·3	11 86	1·54
Mn	339·2	159·7	149·8	19·50	1·50
Zn	284·4	148·1	134·5	17·42	1·50
Cu	274·4	227·0	185·2	16·48	1·51
B	267·9	151·6	112·3	15·28	1·50

affected by foliar application with $CuSO_4$, while it tended to decrease owing to spraying the plants with Mn, Zn, or B. Regarding the leaves, their total soluble carbohydrate content increased only after spraying with Cu, whereas other treatments had negative effects.

Osmotic pressure and electrical conductivity.—From Table I, the data clearly show that the osmotic pressure of the leaf extracts of plants treated with microelements was higher than that of the control ones. In this respect, Henckel[8] concluded that the osmotic pressure of hardened plants increased approximately from 1·5 to 2 atmosphere. From the same table, however, the electrical conductivity of the leaf extract at this growth stage did not show appreciable changes due to foliar application of microelements.

From these results, it might be suggested that foliar application with microelements (here Zn, B, Cu and Mn) enhanced the metabolic processes of carbohydrate. This response was reflected as a pronounced increase in the total soluble carbohydrate and the osmotic pressure of treated plants. In this concern, Sakai[9-11] demonstrated that the greater the effectiveness of cold-hardening treatment, the greater was the rate of conversion of starch into sugar and the greater the sucrose content which had the protective action at low temperatures. Therefore, it might be concluded that foliar spraying of sugar-beet grown in winter season with microelements might stimulate the general physiological processes of the plant leading to increased leaf-area, dry-matter accumulation and high soluble carbohydrate content.

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A TECHNIQUE FOR CUTICULAR STUDIES

There are several techniques in practice, each with its own advantages and disadvantages, for obtaining cuticular preparations. An inexpensive, freely available and readily usable adhesive cement supplied in collapsable tubes with the commercial brand name 'Quickfix' (manufactured by M/s. Wembley Laboratories, Delhi 6) is being used by the author to obtain satisfactory impressions of the cuticular features of various plant organs.

The technique is similar in principle to the peel method used in the study of fossils, and involves smearing of freshly squeezed-out adhesive cement into a thin-layer on the surface of the plant organ and allowing it to dry for about ten minutes. The film formed can be peeled away very easily. Uniformly thin films can be obtained with a little practice. These are mounted in water, keeping the imprinted surface in contact with the cover glass. Such water mounts result in much higher contrasts than those in canada balsam or Euparal.

Using the above technique preparations were obtained from the following materials: leaves of several grasses (see Fig. 1), *Rhoeo discolor*, *Zebrina pendula*, *Crotalaria trifoliata* (Fig. 2), *Catharanthus roseus*, *Ficus religiosa*, and *Indigofera* sp.; stem of *Ephedra foliata*, petrified podocarpaceous wood, leaflets of *Cycas circinalis*, *C. revoluta*, *Encephalartos* sp., and