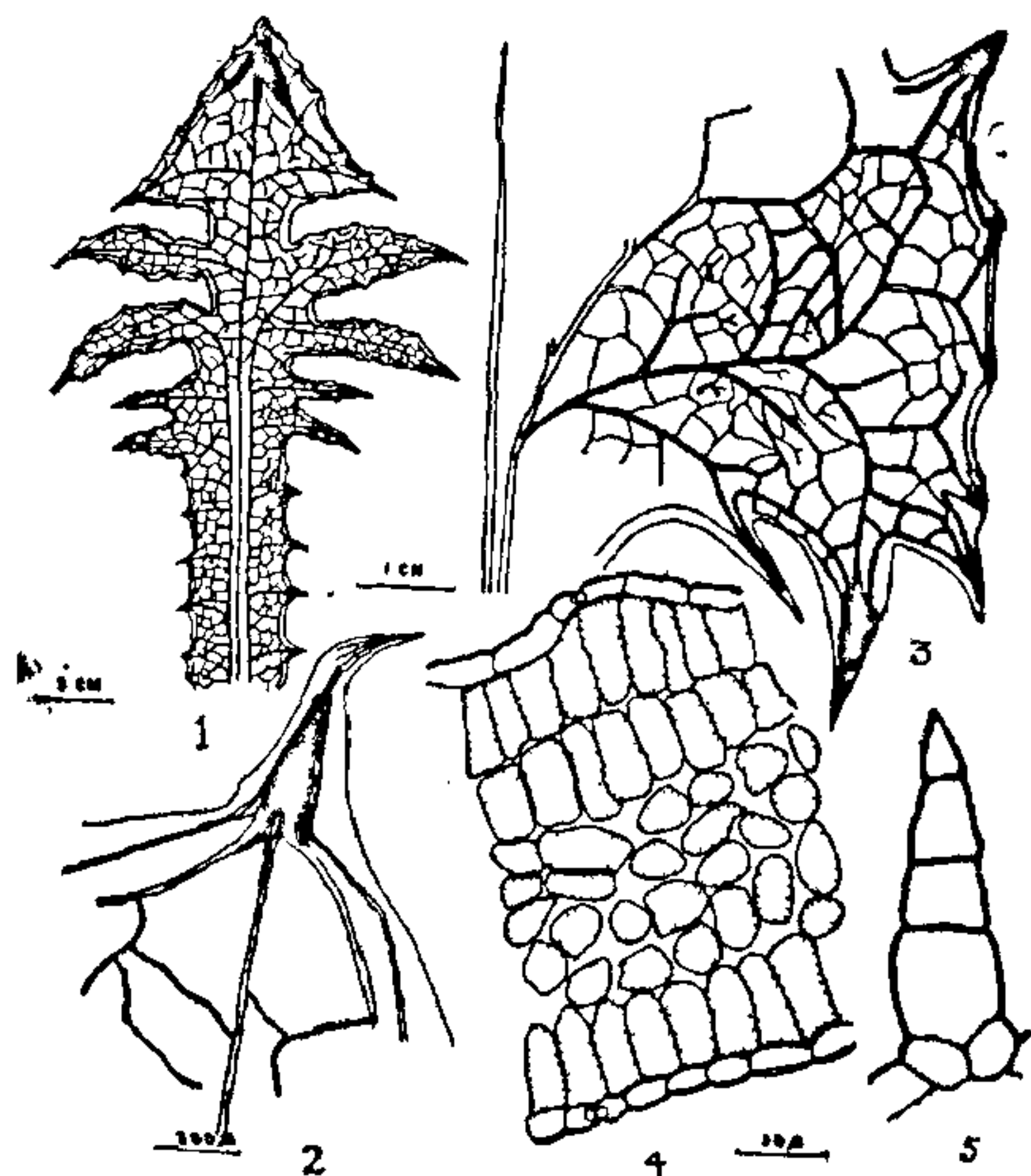


right upto the tip of the teeth where opening is lined by elongated cells (Fig. 2). The large teeth receive the branches of major veins (Fig. 3). Some minor veins run to the margin and terminate at the small teeth and sometimes even without any reference to marginal teeth (Fig. 3). The termination shows a strong central vein which is the extension of secondary veins accompanied by two weak veins on either side (Fig. 2). Sometimes in large lobes three to four veins accompany the central vein (Fig. 3). In larger lobes the veins anastomose and then terminate. The minor veins at the margin are discontinuous (Fig. 1) showing a remote sign of camptodromy. At the terminations, the epidermal cells are elongated into a long extension which opens to the surface. These openings are of different types, depending upon the length of the dentation and size of the leaf. In small leaves the teeth are blunt and small veins terminate in an opening which is surrounded by rounded cells. Quaternaries and its branches constitute the minor veins, forming the areoles which mostly enclose one free vein. Areoles are comparatively larger.



FIGS. 1-5. *Sonchus arvensis*. Fig. 1. Entire leaf. Fig. 2. Marginal termination. Fig. 3. Enlarged lobes with marginal dentations. Fig. 4. T.S. of leaf. Fig. 5. Trichome.

Size of the areoles varies from 136,800 microns to 228,000 microns. Large areoles enclose 1 to 3 free vein ends, while, small areoles enclose 1 free vein end. Free vein ends are simple, rod-shaped or sometimes forked. Tracheids are not associated with the

free vein ends. Intra-marginal tracheids occur at the terminations. Palisade ratio is 3.

#### Leaf Histology

Upper epidermal cells are more elongated and slightly larger than the lower epidermal cells. Stomata occur on both the surfaces at the same level as that of the epidermal cells. Upper epidermis is followed by two layers of palisade and lower epidermis is followed by one layer palisade. In between occurs loosely arranged parenchyma (Fig. 4). Midrib is traversed by three vascular strands, one median and two laterals, the median being larger than laterals. Trichomes are simple uniseriate, three to five cells in height. Pedestal cells are small, two in number, and the body cells taper towards the apex (Fig. 5).

#### Discussion

*Sonchus* along with *Launea* Banerjee and Deshpande<sup>1</sup> may be considered as representatives of extremely open type venation pattern in Compositae. All the major as well as minor veins at the margin are craspedodromous in nature. These two plants form a group which is different from other members of Compositae. A definite line can be traced from *Launea* and *Sonchus* to other members which show different grades in close type of venation pattern.

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#### DWARF SUNFLOWERS FOR FITTING IN ROTATIONS REQUIRING A SHORT DURATION CROP

SUNFLOWER (*Helianthus annuus* L.) has gained importance as an oil seed crop because of the spectacular advance in yield and oil percentage attained in it by the Russian workers<sup>1</sup>. In India, although Russian and Western varieties have been tried, this crop has not yet proved a success due to a number of problems which come up during cultivation<sup>2</sup>. The major problem at present is poor seed set and filling which besides genetics is influenced by physiological and



environmental factors'. The present communication describes the development of dwarf sunflowers, their performance during Zaid and their suitability as a short duration crop in a rotation cycle. In the dwarf sunflowers, as is obvious from the data given below, it has been possible to obtain reasonably good seed set. Further, because of relatively high degree of homozygosity, earliness and a number of other characteristic features like plant height, head diameter, seed shape, etc., they can further be used as a breeding material, particularly for breeding high yielding early varieties.

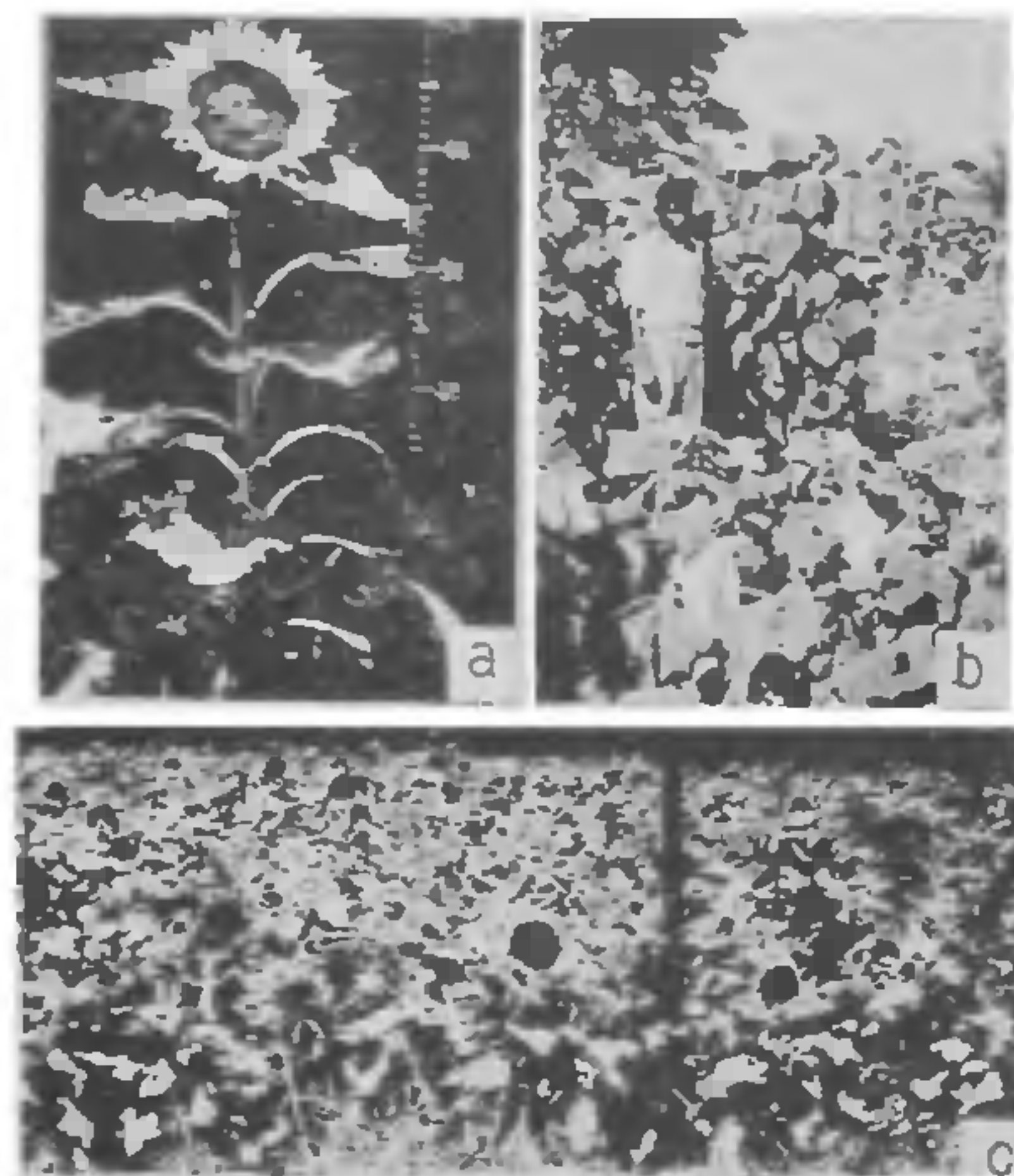


FIG. 1. *a-c.* (a) A 65 cm sunflower dwarf in bloom. (b) Multiplication of the dwarf line (in the foreground) by interpollination and further selection (bagged heads). The normal sized sunflowers are in the background. (c) A field of dwarf sunflowers in Zaid photographed one and a half months after sowing. The average plant height is between 60–70 cm.

*Development of the dwarf sunflowers*—During the *Kharif* (July to October) of 1968, a germplasm collection of 13 Russian varieties (Semena, Cerinanka, Peredovick, VN. 6540a, VN. 6540b, VN. 8883, Majak, Armavirský 3497a, Armavirský 3497b, Zelenka 368, VN. 8931a, VN. 8931b and Armavirck) was evaluated at the National Botanic Gardens, Lucknow. Out of the segregating population of the variety Semena, 3 plants with short height (1–1.25 m), early maturity (90–100 days) and good seed yield (8–10 g/plant) were selected. They were interpollinated for the multiplication of the seed. The selection for the above characters was continued during the subsequent generations when the progenies from the selected

plants were grown either in isolation from other sunflower fields or their seed was multiplied by controlled interpollination. As a result of this it has been possible not only to fix the above mentioned character but also to diminish plant height, increase earliness and yield in comparison to the original stock.

*Performance during Zaid*:— Although the performance of dwarf sunflowers has been studied over several seasons, the present report gives their performance only as a Zaid crop (late February to June). It is during this season that they are likely to have their greatest utility because the lands lie idle for about a couple of months during various parts of Zaid and it is difficult to find a suitable crop for this period.

The seeds were sown on February 20, 1977 in an experimental plot consisting of 12 beds, each of the size of 6 m × 6 m. The plant to plant as well as row to row distance was 25 cm. A basal doze of farm yard manure at the rate of 350 qt/ha was applied at the cultivation stage. The experiment consisted of four treatments, each replicated thrice following a randomized block design. Treatment 1 consisted of control only and no fertilizer was applied. In treatments 2–4, phosphorus was uniformly applied at the rate of 60 kg/ha while nitrogen was applied at the rate of 60, 90 and 110 kg/ha respectively. The fertilizer was applied in two equal splits at an interval of 15 days, the first doze being applied 15 days after seed germination. The oil was estimated by soxhlet extraction using petroleum ether.

The crop was harvested on April 30. It is thus a very short duration crop. In Zaid it takes 65–70 days to mature, though, as observed by us earlier, during *Rabi* this duration increases to 90–95 days. The performance for seed yield and oil percentage is given in Table I. The average total yield estimated on the basis of filled seed is 11.30 qt/ha when maximum amount of nitrogen is applied (treatment 3). Further the application of nitrogen at the rate of 110 kg/ha leads to significant increase in the yield of filled seeds. The best manure doze for this line is yet to be investigated. The oil percentage is around 40. There is an indication that seed filling improves with the application of nitrogen as the seed number/10 g is less in treatment 3 as compared to the control and treatments 1 and 2, though the differences are not significant. The partial filling of seeds still continues to be the major problem and the experiments are underway to improve yields, further by overcoming this difficulty both by genetic and agronomic means.

TABLE I  
The performance of dwarf sunflowers during Zaid 1977

	Control	Treatment 1	Treatment 2	Treatment 3
<i>Seed yield (kg)/block (6 × 6 m)</i>				
<i>Filled seeds</i>				
(a) Average	3.32±0.064	3.78±0.317	4.27±0.335	4.41±0.339
(b) Range	3.17-3.44	3.27-4.55	3.47-4.84	3.63-4.98
C.D. (5%):	0.670			
<i>Unfilled seeds</i>				
(a) Average	0.144±1.38	0.157±1.57	0.178±0.97	0.165±0.56
(b) Range	0.125-0.178	0.133-0.195	0.160-0.195	0.151-0.173
C.D. (5%):	0.044			
<i>Total seed yield</i>				
(a) Average	3.46±0.050	3.94±0.312	4.44±0.343	4.57±0.319
(b) Range	33.5-3.56	3.41-4.68	3.63-5.03	3.80-5.03
C.D. (5%):	0.677			
<i>Seed number/10 g</i>				
<i>Filled</i>				
(a) Average	336±1.54	337±24.06	339±53.06	310±39.58
(b) Range	334-340	286-388	218-440	220-386
C.D. (5%):	96.19			
<i>Unfilled</i>				
(a) Average	732±16.10	691±32.92	702±23.63	722±5.93
(b) Range	693-750	612-745	650-750	710-735
C.D. (5%):	87.36			
<i>Oil percentage</i>				
(a) Average	39.68±0.285	40.35±0.629	40.35±0.487	41.12±0.462
(b) Range	39.00-40.15	39.10-41.75	39.50-41.50	40.00-41.85
C.D. (5%):	2.114			
<i>Filled seed yield qt/ha (estimated)</i>				
	8.45±0.16	9.62±0.80	10.85±0.85	11.30±0.86

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### ONE NEW INTERSPECIFIC HYBRID IN THE GENUS *PASSIFLORA*

#### Introduction

Of the 400 known species of the genus *Passiflora* about 50 to 60 bear edible fruits. Probably all these are indigenous to American tropics. Although a few species have been introduced into tropical and subtropical regions and have become the basis for local industries, the majority of the edible passion fruits are unknown outside these limited areas where they grow wild or are sometimes cultivated.

Nakasone *et al.*<sup>1</sup> have obtained a hybrid between *P. edulis* f. *flavicarpa* and *P. edulis*. This cross has opened the door for the development of new and useful varieties combining desirable traits from both

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