

TRANSLOCATION OF ^{14}C METABOLITES FROM DIFFERENT LEAVES TO THE GRAIN SORGHUM

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MEASUREMENT of the contribution by different leaves of the plant to the grain yield, has generally depended on the yield reduction techniques (prevention of photosynthesis), but there are doubts about their validity⁵. Use of ^{14}C has greatly helped in working out fairly accurately the contribution of different plant parts to the grain and also in the identification of the direct source of grain carbohydrate. A method based on the use of ^{14}C was therefore used in the present work to trace the direction of translocation of photosynthates from different leaves.

Translocation studies were undertaken in sorghum plants Var. Swarna grown in cement pots during 1975 and 1976 *kharif* seasons. The photosynthates of top six leaves were labelled with ^{14}C (10 μCi), one week after anthesis³. Each of the six leaves was exposed separately to radioactive CO_2 in an enclosed plexi-glass chamber for a period of half an hour. The $^{14}\text{CO}_2$ was fed to the leaves while still attached to the plants. Two plants treated with ^{14}C was harvested

48 hours after feeding and two plants at maturity in each treatment and separated into stem, leaves and ear. The radioactivity was assayed following the method used for bajra³.

It will be seen from the data (Table I) that upto 48 hours after treating the leaves with ^{14}C , about 50–85 per cent of the total radioactivity recovered from the whole plant, was still present in each of the treated leaves. It was also observed that the labelled photosynthates from each of the upper six leaves were translocated to the grain also within 48 hours after feeding. However, rate of translocation was very much dependent on the position of a particular leaf in relation to the site of sink, *i.e.*, ear *e.g.*, flag leaf which is nearest to the ear transported about 27% during the first season and 31% during the second season and each of the 2nd, 3rd, 4th, 5th and 6th leaves, about 23%, 22%, 15%, 11% and 7% during the first season, 26%, 21%, 13%, 11% and 7% during the second season respectively within 48 hours after feeding. However, by the harvest time about 89–97% of the radioactivity recovered from the whole plant was translocated from each of the fed six leaves to the ear and incorporated in the grain (Table II). The above results indicate that leaves which are nearer to the ear, contribute relatively more photosynthates to the grain as compared to those which are down below the stem. Similar results were reported in bajra³. Preferential movement of radioactivity from flag leaf to the ear was observed in wheat^{1,2,4}. On the basis of labelled experiments in wheat, it has been suggested⁶ that plant parts nearer to the grain, contribute more for its development, the order being ear, upper stem, flag leaf, lower leaves, and stem respectively.

TABLE I

Percentage of the total radioactivity recovered in different plant parts 48 hours after feeding

Leaf No.	Upper stem	Lower stem	Fed leaf	Leaves above fed leaf	Leaves below fed leaf	Grain
1975						
Flag leaf	..	12.3	55.6	..	5.6	26.5
2nd leaf	7.3	5.1	57.3	4.4	2.5	23.4
3rd leaf	3.1	4.2	65.0	2.1	1.8	21.8
4th leaf	5.8	2.6	75.1	1.2	0.9	15.4
5th leaf	4.9	2.3	79.7	1.2	0.7	11.2
6th leaf	3.9	3.9	84.7	2.2	0.8	7.4
1976						
Flag leaf	..	9.4	52.1	..	8.2	31.2
2nd leaf	6.6	4.7	56.1	5.4	1.8	25.8
3rd leaf	5.1	2.5	67.9	1.9	2.2	20.6
4th leaf	4.3	1.8	76.9	2.5	1.2	13.3
5th leaf	6.0	1.4	79.8	3.7	0.9	10.9
6th leaf	1.4	1.2	88.1	1.9	0.9	6.5

TABLE II
Percentage of the total radioactivity recovered in the grain and stem at harvest

Leaf No.	Grain		Stem	
	1975	1976	1975	1976
Flag leaf	97.2	96.1	2.8	3.9
2nd leaf	97.4	95.8	2.6	4.2
3rd leaf	96.6	97.3	3.4	2.7
4th leaf	96.5	96.8	3.5	3.2
5th leaf	91.5	94.6	8.5	5.4
6th leaf	88.7	86.5	12.3	13.5

Authors wish to thank the Director, IARI, New Delhi, for facilities and ICAR, New Delhi, for the grant of a senior fellowship to the senior author.

October 1, 1980.

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SCANNING ELECTRON MICROSCOPIC ANALYSIS OF POLLEN IN TRISTYLOUS *EICHHORNIA CRASSIPES* (MART.) SOLMS. (PONTEDERIACEAE)

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TRISTYLY is a genetic polymorphism in which a species exist in three flower forms in natural populations. Each flower form is characterised by a style length and two tiers of stamens. Thus, the long styled form is associated with mid and short stamens; the mid-styled form with long and short stamens and the short-styled form with long and mid stamens. Darwin¹ studied tristily in *Pontederia* species (Pontederiaceae). Various aspects of tristily in *Eichhornia crassipes* have been studied by Barrett²; Reddy and Bahadur³ and Bangaru Laxmi⁴.

Although pollen size morphism is known in several tristylous species Darwin¹, Dulberger⁵, Hyde and Adams⁶ and Coz Campos⁷ appear to be the earliest

to observe the differences in the exine pattern in the three types of pollen grains in tristylous species of Lythraceae. This report presents observations on pollen exine morphism in relation to tristily as seen in SEM in *E. crassipes*.

For the SEM study, pollen grains of short, mid and long stamens of short- mid- and long-styled flowers of *E. crassipes* (Mart.) Solms. were collected separately and acetolysed following the method of Erdtman⁸. Acetolysed pollen grains were stored in absolute ethanol. The pollen grains were coated with silver under vacuum and scanned on a Cambridge Stereo-scan Microscope (Model S₄-10, Cambridge Scientific Instruments Limited, England), housed at Indian Institute of Technology, New Delhi.

In Fig. 1 the stereo-structures of pollen grains of long, mid and short stamens of *E. crassipes* are shown. The pollen grains are clearly trimorphic not only in size but also in their exine pattern. The details are described below.

Pollen grains produced in the long stamens of short- and mid-styled forms are large (86.8 × 29.3 μm), sausage shaped, 2 sulcate. Exine shows irregular mound like areas, stretched all over the pollen surface, exine psilate (Figs. 1-2).

Pollen grains produced in the mid stamens of long- and short-styled forms are medium sized (85.8 × 33.0 μm), lens-shaped, 2 sulcate. Exine shows prominent irregular pointed processes of various sizes, some processes are blunt (Figs. 3-4).

Pollen grains produced in the short stamens of long- and mid-styled forms are small (78.0 × 29.6 μm), crescents-shaped, 2 sulcate. Exine shows prominent irregular verrucae of various sizes, coarsely verrucate, dense, coalescing at the base (Figs. 5 and 6).

It may be pointed out that Rao and Rao⁹ and Raj and Saxena¹⁰ have studied exine morphology of *E. crassipes* under the light microscope but make no comment on tristily. They have described the exine as either smooth or faintly reticulate and the pollen grains as 1 or 2 sulcate.

From the description, it is clear that the tristily in *E. crassipes* is also expressed in the exine morphism of pollen in the stamens of various heights. It is interesting to note that although stigma and pollen heteromorphism in a number of distylous species has been studied, there is no comparable study on any tristylous species so far. The present observations on SEM of exine, however, is comparable to that in *Biophytum intermedium* studied by Bahadur *et al.*¹¹ Thus, the pollen morphism not only in size but exine appears to be related to the morphism in the stigmatic papillae and the chemical differences associated with