mate metabolites were low and they fell below the accepted tolerance level of 0·1 ppm fixed by the Environmental Protection Agency, USA (Anon.[1]) and such results of low residues in the harvested produce (below the tolerance level of EPA, USA) was encountered by Bhattacharjee *et al.*[3], in soybeans, Kapoor and Kalra[6] in sorghum and Rajukkannu *et al.*[7,8], in sweet potato and rice.

All these results showed that carbofuran when applied to banana, at the time of planting, got translocated to pseudo-stem and fruits. The residues, although in small amounts, persisted in pseudo-stem and fruits till the time of harvest. The content of carbofuran and other toxic metabolites in the edible parts was so low that they were below the tolerance level of EPA, USA and thus carbofuran can safely be used as a plant protection chemical in banana against the root nematode *without* any residue hazard.

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PHOTOSYNTHETIC CARBON DIOXIDE FIXATION BY RICE EARS

IN cereals, though the major photosynthetic contribution is by leaf blades, the leaf sheath and the inflorescence also contribute considerably towards the total photosynthesis of the plant[1,2]. It is reported from shading or detachment treatments that the total contribution of ear or panicle photosynthesis to grain weight in rice is in the range of 8 to 22%[3-6]. Differences reported on the relative contribution of ears to total dry weight may be due to techniques employed, varietal characteristics or management practices[7]. In the present investigation, the varietal differences in the relative photosynthetic activity of the ear were assessed by $^{14}CO_2$ technique[8].

Photosynthetic CO_2 fixation was determined in the excised ears of uniform age at anthesis in 4 field grown rice varieties (dry season, 1977). Photosynthetic rate in the leaves (second from top) was also assessed simultaneously. The cpm values obtained were converted to mg CO_2 as per Naylor and Teare[9] and the activity was expressed as mg CO_2 fixed per g fresh material per hour, so as to facilitate meaningful comparison between leaves and ears. In a parallel set, total chlorophyll content was also estimated following acetone extraction[10]. Each variety was replicated five times and there were five ears or leaves under each treatment.

The photosynthetic activity of ears and leaves differed significantly among the rice varieties (Table I). Ears fixed less CO_2, varying from 1·2 (*Ptb.* 10) to 4·5 mg (*JS* 52–102), accounting only 5 to 20% of the leaf activity per g f.wt.

TABLE I

Leaf and ear photosynthesis in rice

(mg CO_2 g^{-1} fresh wt. $hr.^{-1}$)

Variety	Leaf	Ear	Mean	% of leaf
Ptb. 10	26·0	1·2	13·6	4·6
JS. 52–102	22·1	4·5	13·3	20·4
Ratna	32·0	2·5	17·3	7·8
T. 3 mut.	22·1	1·4	11·7	6·3
Mean	25·5	2·4	14·0	9·8

C.D. (5%) Variety = 2·3, Part = 1·6, Interaction = 2·3.

The chlorophyll content was considerably lower in the ears than in the leaves and did not vary significantly between the varieties (Table II). However, the efficiency in $^{14}CO_2$ fixation per unit chlorophyll differed remarkably among the varieties. Thus, although *Ptb.* 10 and *JS.* 52–102 had almost the same

quantity of chlorophyll in the ears, the CO_2 assimilation per mg chlorophyll was only 53 μM in the former as against 183 μM CO_2 in the latter.

TABLE II

Chlorophyll content and photosynthetic efficiency of rice leaves and ears

Variety	Chlorophyll (mg^{-1} g^{-1} f.wt.) Leaf	Ear	Mean	% of leaf
Ptb. 10	2·49 (237)	0·51 (53)	1·50 (145)	20·5 (21·5)
JS. 52–102	1·98 (254)	0·56 (183)	1·27 (218)	28·3 (72·0)
Ratna	2·47 (294)	0·50 (113)	1·49 (204)	20·2 (38·4)
T. 3 mut.	2·22 (218)	0·33 (101)	1·27 (160)	14·9 (46·2)
Mean	2·29 (251)	0·48 (112)	1·38 (182)	21·0 (44·5)

Figures in parenthesis indicate photosynthetic efficiency in μM CO_2 mg^{-1} chl. hr^{-1}.

C.D. (5%) varieties = *ns*, part = 0·24, Interaction = *ns*.

The results indicate that efficiency of the varieties in leaf and ear photosynthesis is not in the same order. The local variety *Ptb.* 10 which is efficient in leaf photosyntheis is not so efficient in ear assimilation whereas the reverse was the trend with the high yielding culture, *JS.* 52–102.

Discussing the various methods employed earlier Thorne[11] suggested that the measurement of CO_2 exchange would give the most reliable estimate of the contribution of different plant parts to grain carbohydrates. The present study indicates the possibility of utilising ^{14}C photosynthesis technique for rapid identification of rice cultures that are efficient in ear photosynthesis.

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EFFECT OF MORPHACTIN ON THE LEAF EPIDERMIS OF *LYCOPERSICON ESCULENTUM* MILL.

MORPHACTINS, a versatile class of synthetic bioregulants, exhibit a wide range of diverse influences on plant growth and development. The degree of the effect depends on the stage of development of the object at the time of application[1–3]. During a study of the effect of different doses of morphactin CME 74050 on *L. esculentum* Mill var. Pusa Ruby, many marked changes in the epidermal tissue of the leaf have been observed. In this communication, variations caused by it have been presented in comparison to the normal plants. In general, in the treated plants, the division of the epidermal cells is checked and a gradual reduction in the number of stomata and epidermal cells per unit area of the leaf has been noted. The length of the guard cells is enhanced and the cells are unique in having large number of starch grains. In addition to these features, occurrence of contiguous stomata and incompletely developed stomata are quite common.

L. esculentum seedlings were raised in the university botanical garden in October in five beds. Forty days old seedlings were sprayed with 1·0, 2·5, 5·0 and 7·5 ppm concentration of morphactin CME 74050 and 0·02% Tween-20 was used as a wetting agent. One bed was kept as control and sprayed with the wetting agent only. In all, 5 sprays were made, first two at an interval of one week, then two more at intervals of 15 days and the final spray 30 days after the fourth application. After 15 days of the final spray, 4th nodal leaves were collected and fixed in formaldehyde : acetic acid : 70% alcohol (5 : 5 : 90). The lower epidermal peels of five leaves under each concentration were stained in Haematoxylin, mounted in 50% glycerine and studied.

The controls have slightly undulated cells and irregularly oriented stomata (Fig. 1 A), while in the leaves of morphactin treated plants the epidermal cells have deep and larger undulations. Maximum undulation