2. $C^{14}O_2$ assimilation by light-grown w_3 albino and etiolated normal and mutant seedlings.

Both normal and mutant w_3 seedlings have been found to be able to form chlorophyll-a under a nitrogen atmosphere.

It is questionable if the newly transformed chlorophyll-a is photosynthetically active. In order to clarify this problem, normal and mutant seedlings were grown under light and in darkness for two weeks. The seedlings were placed in a desiccator-type reaction chamber and flushed three times with nitrogen. In this nitrogen atmosphere, the seedlings were illuminated for 25 minutes with 800-900 Ft. C. light. The treatment allowed the etiolated normal and mutant seedlings to transform all of their protochlorophyll to chlorophyll-a. After the photoconversion of chlorophylls was completed in about 25 minutes, a normal aerobic photosynthetic environment with $C^{14}O_2$ was restored. Seedlings were allowed to photosynthesize for 10 minutes. The experiment was terminated. The seedlings were killed in liquid nitrogen, and the total radioactivity determined by the method previously described in the Newsletter (MNL 37:18, 1963).

For normal green seedlings, no correlation was found between chlorophyll concentration and rate of carbon dioxide fixation. This suggests that the rate of photosynthesis is controlled by the enzymes or enzymic reactions involved in photosynthesis rather than by pigment content under light conditions. Generally, green plants produced chlorophyll in excess amount of that required in coordinated activity with the other factors or cofactors in photosynthesis.

It is, however, somewhat surprising that the light-grown albino seedlings accumulated a higher amount of C^{14} than either etiolated normal or mutant seedlings. The latter contained some chlorophyll-a while the light-grown albino seedlings were completely depleted of any kind of photosynthetic pigments. Apparently the newly transformed chlorophyll-a is not photosynthetically active. A Wood-Werkman type of carboxylation of pyruvate to form a four-carbon dicarboxylic acid would account for the entry of $C^{14}O_2$ into these three types of seedlings. As to the higher rate of CO_2 assimilation by the light-grown albino seedlings, we postulate that the variable growth conditions under light and darkness may impart a differential stimulus for internal physiological activity in maize seedlings. This in turn is responsible for the observed differences.

Table 1
Relative Rates of Carbon Dioxide Assimilation by Normal and Mutant Seedlings Grown in Light and Darkness#
Race: Nal-Tel

Entry*	Total radioactivity	Sample dry wt. mg.	Cmp / sample mg.	%
1.	680,330	104.97	6,481	100.00
2.	1,570	122.55	13	0.20
3.	1,610	48.00	34	0.52
4.	2,880	125.10	23	0.35

Seedlings preincubated under anaerobic illumination for 25 minutes before reaction.

Table 2
Relative Rates of Carbon Dioxide Assimilation by Normal and Mutant Seedlings Grown in Light and Darkness
Race: Celaya

Entry*	Total radioactivity	Sample dry wt. mg.	Cmp / sample mg.	%
1.	183,760	134.65	1,365	100.00
2.	1,540	98.73	16	1.17
3.	4,540	127.25	36	2.63
4.	7,140	235.60	30	2.19

Table 3
Relative Rates of Carbon Dioxide Assimilation by Normal and Mutant Seedlings Grown in Light and Darkness
Race: Maiz Dulce

Entry*	Total radioactivity	Sample dry wt. mg.	Cmp / sample mg.	%
1.	1,280,050	213.76	5,988	100.00
2.	3,350	80.76	41	0.68
3.	8,650	135.30	64	1.07
4.	9,700	392.20	25	0.42

Table 4
Relative Rates of Carbon Dioxide Assimilation by Normal and Mutant Seedlings Grown in Light and Darkness
Race: Arrocillo Amarillo

Entry*	Total radioactivity	Sample dry wt. mg.	Cmp / sample mg.	%
1.	498,675	67.79	7,356	100.00
2.	1,030	46.70	22	0.30
3.	4,300	62.22	69	0.94
4.	3,120	58.91	53	0.72

*Entry Number: 1 = Light-grown normal seedlings
2 = Etiolated normal seedlings
3 = Light-grown mutant seedlings
4 = Etiolated mutant seedlings.

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3. Excised corn roots.

Is heterosis determined, at least in part, by the roots of plants? Our early efforts to use excised corn roots in a study of this question quickly demonstrated that we did not know how to grow such roots. Neither