

19

Effect of the Spray of the Mineral Fertilizer  
"Schouchan" on the Chlorophyll Content and  
Photosynthesis of Okra Leaves.

By

A. E. Dowidar

M. El-S. Abdulla

Biology Department, Faculty of Education, Ain Shams Univ.  
Cairo

Abstract. Schouchan, in general, increased chlorophyll content and the rate of photosynthesis of okra leaves. The maximum effect was observed after 30 hours of application. It started to decrease afterwards but remained above the control.

"Schouchan" is a spray fertilizer manufactured by El-Nasr Chemical Co. Afifi and Abdulla (in press) reported that spraying okra plants variety "Gold Coast" with this fertilizer resulted in a decrease of the growth vigour of the plant. Analysis of the shoot-system of the treated plants showed a general decrease in ammonia-N and organic phosphorus.

In the present paper, the effect of "Schouchan" on the chlorophyll content and photosynthesis of Okra leaves will be presented.

221

## Material and Methods

were

Seeds of okra, variety "Gold Coast" cultivated in 25 cm-diameter pots containing clay soil. Ten pots were used for each treatment. The pots were irrigated every other day with equal amounts of tap water. Forty days old plants were sprayed with half, one and double field dose of the fertilizer suspension. The concentration of the recommended field dose equals 1 gm/300 ml distilled water. The mineral fertilizer "Schouchan" was reported to contain N<sub>2</sub>, P, Ca, Mg, Fe, Cu, S, B, Zn and Mn.

After different hours of application, leaves of control and treated plants were homogenized in 50% acetone and their chlorophyll content was calculated according to Vernon (1960). At the same time, the rate of photosynthesis of leaf discs was carried out in a Warburg apparatus using the method adopted by Goren (1969). A constant concentration of 2% atmospheric CO<sub>2</sub> was maintained in the Warburg vessels by carbonate buffer (Bladergroen, 1960). The experiments were carried out at 20°C and under light intensity of 3000 footcandle.

## Results

After thirty hours of "Schouchan" treatment, the total chlorophyll content of okra leaves (fig.1) was found to be 100%, 130% and 132% of the control when half, one and double field dose were used respectively. Chlorophyll a (fig.2) was found to be 98%, 120% and 143% respectively, and chlorophyll b

(fig.3) was found to be 114 %, 150 % and 114 % respectively.

After one hundred hours of application, the total chlorophyll content of okra leaves (fig.1) was found to be 103 %, 103 %, and 108 % of the control at the above mentioned concentrations respectively. Chlorophyll a (fig.2) was found to be 101 %, 102 % and 100 % of the control and chlorophyll b (fig.3) was found to be 106 %, 110 % and 100 % respectively.

The rate of photosynthesis of excised okra leaves (fig.4) was found to be 111 %, 115% and 135% of the control in the first hour after application with half, one and double field dose respectively. After thirty hours of application, the rate of photosynthesis was found to be 110 %, 118 % and 163% of the control. After one hundred hours of application, it was found to be 110 %, 113 % and 125 % of the control.

### Discussion

The possibility of supplying nutrient elements to the plants as foliar spray (Boynton, 1954; Shereverya, 1959 and Narula et al.; 1967) is undoubtedly of great importance. Ashour (1972) studied the effect of spraying wheat plants with the micro-elements; B, Zn, Mn, Cu and Mo on yield components and chemical constituents of grain.

Although "Schouchar" is used as a spray fertilizer, Afifi and Abdulla (in press) reported that spraying okra plants with this chemical resulted in a significant decrease in the root length, fresh and dry weight of the plants. Analysis of the treated plants showed that the total carbohydrate and the nitrogen fractions decreased with the exception of the ammonia-N fraction which increased. We thought that the effect

of "Schouchan" on the growth vigour and the carbohydrate content of okra plants may be attributed to the effect of the fertilizer on the chlorophyll content and consequently the rate of photosynthesis of the treated plants.

However, the results in this investigation showed that there is a transient increase in the chlorophyll content of okra leaves in the first thirty hours after application. This increase in the chlorophyll content started to decrease with time. After one month's course of application chlorophyll a content - the important pigment in photosynthesis - was almost the same as that of the control.

It was also observed that the rate of photosynthesis was increased in the first thirty hours of application and started to decrease with time, but remained above the control.

Fabry et.al. (1973) studied the effect of trace elements on *Spinacia oleracea* and found that boron and manganese activated chlorophyll biosynthesis in the plants. Thus the increase in chlorophyll content and the consequent increase in the rate of photosynthesis due to "Schouchan" application reported in the present investigation may be attributed to the presence of boron and manganese. However, the effect of "Schouchan" on the growth vigour, carbohydrate and nitrogen content of okra plants, reported by Afifi and Abdulla (in press), could not be attributed to the effect of the fertilizer on the chlorophyll content and photosynthesis of okra plants.

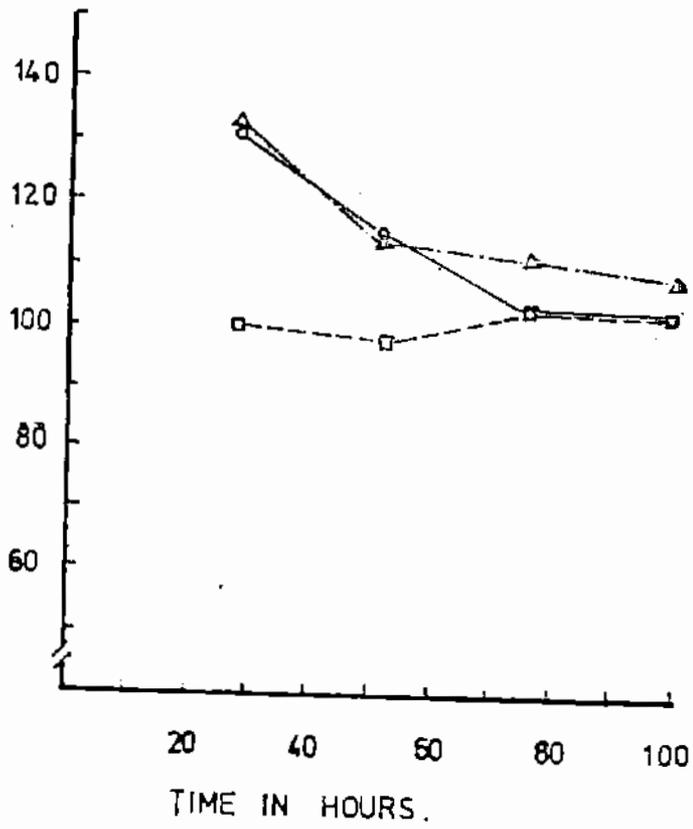
#### References

- Afifi, A.F., Abdulla, M.S. (in press): Effect of spraying developed shoot system with mineral fertilizer "Schouchan" on photosynthetic activity of both okra and lupine plants. *Egyptian J. of Physiol.*

- Ashour, H.I. and Hegazi, S.M. (1972): Response of Wheat to foliar nutrition with micro-elements under Egyptian conditions. *Egypt. J. Bot.* 15, 95
- Bladergroen, W. (1960): *Problems in Photosynthesis*, Charles Thomas Publ. U.S.A.
- Boynon, D. (1954): Nutrition by foliar application. *Ann. Rev. Pl. Physiol.*, 5: 31.
- Fahmy, A., Selim, O.A., El-Sarawie, M.C. and Naguib, E. (1973): Influence of boron and manganese upon growth and development of flax (*linum usitatissimum* L.). *Egypt. J. Bot.* 16: 1.
- Goren, R. (1960): The effect of fluometuron on the behaviour of citrus leaves. *Weed Res.* 9: 121-135.
- Joshi, P.N., Singh, S.P., Rao, U.R. and Spivastava, O.P. (1967): Preliminary studies on response of wheat-crop to foliar spraying with micro-nutrients. *Sci. Cult.*, 33: 483.
- Масаревска, В.И. (1959): Взаимосвязь при-кормового питания и питания растений. "The interrelationship between foliar and root mineral nutrition." *Sov. Plant Physiol.* 6: 18.
- Vernon, L.F. (1960): Spectrophotometric determination of chlorophylls and pheophytins in plant extracts. *Analytical Chem.* Vol. 32, No. 9: 1144-1150.

296

WATER SOLUBILITY CONTENT, % OF CONTROL.



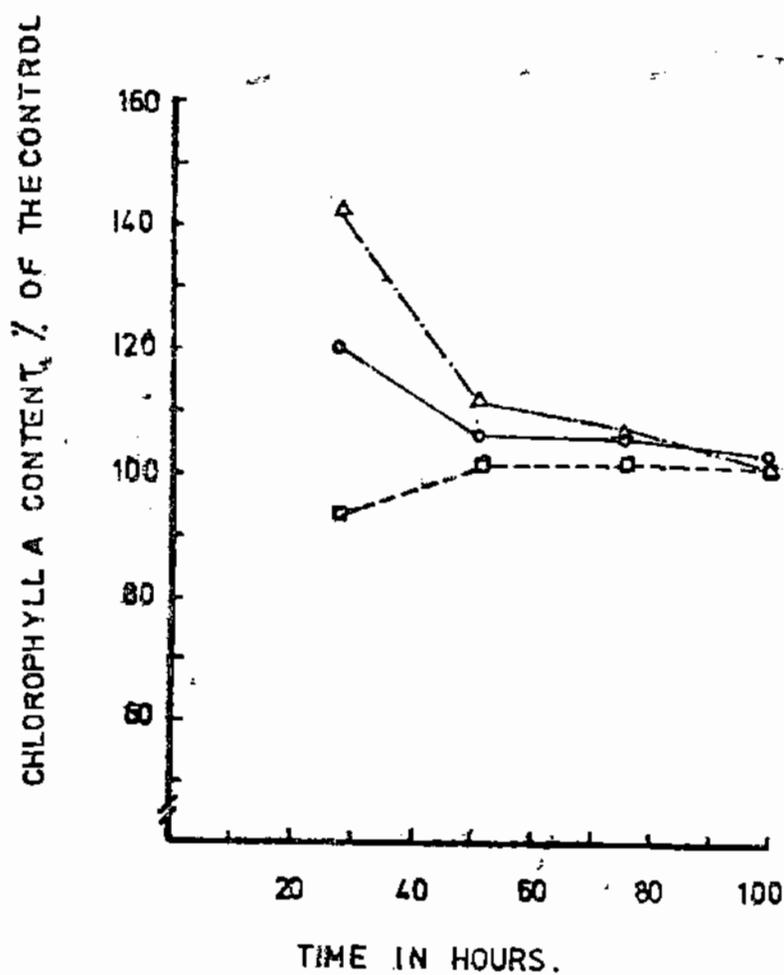


Fig. 2. Effect of "Schouchan" on chlorophyll

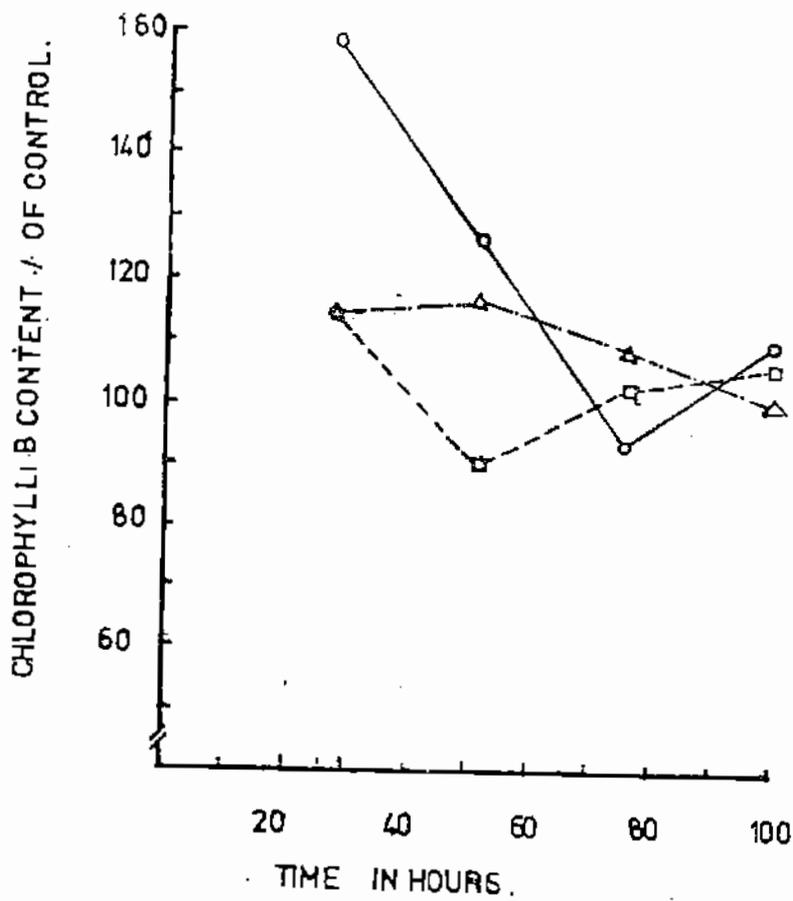


Fig. 3. Effect of 'Sneuchan' on chlorophyll b content

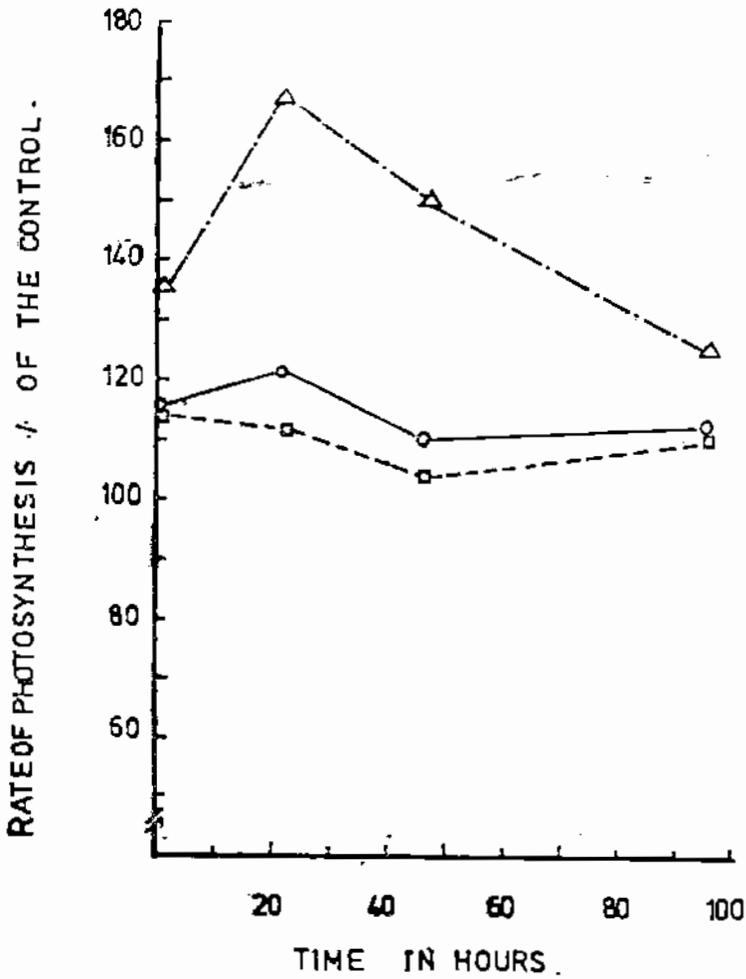


Fig 4: Effect of "Schouchan" on the rate of photosynthesis of okra leaves (□ - 1/2 Field dose, ○ - Field dose, ▲ - 2 Field dose)