

There is no justification for the assumption that the clinkers are of meteoric origin.

Their greenish tint is due to manganese in the manganate state. Although the manganese content of Sample III is much greater than that of either of the other samples, it is not unusual. Various investigators<sup>1</sup> report quantities of  $Mn_3O_4$  which range from less than 1 per cent. to over 40 per cent. of the pure ash of the wood.

The peculiar rock-like character of the clinkers is probably due to the collection of a large quantity of the ash in the hollow snag, followed by occasional wetting from rain and finally a fusion of the mass during a later vigorous burning of the surrounding wood. It is doubtful if any chemical action due to the clinker would be capable of causing ignition of a snag and a rekindling of a fire. The formation of the clinkers is probably incidental to hold-over fires.

DUANE T. ENGLIS  
W. N. DAY

CHEMICAL LABORATORY,  
UNIVERSITY OF ILLINOIS

#### THE EFFECT OF X-RAYS ON POTATO TUBERS FOR "SEED"<sup>1</sup>

IN view of the recent article by Johnson<sup>2</sup> on increased tuberization of potatoes caused by X-rays, it may be worth while to report results of a similar experiment in which the findings were contrary to those indicated above. Certified "seed" of both Irish Cobbler and Green Mountain varieties was used, and two dosages of X-rays were employed.

One half of each tuber was irradiated and the other half was left untreated as a control. One lot of half tubers was irradiated for ten minutes and a second lot for five minutes, using a Waite and Bartlett machine, 200 K.V., 4 M.A., distance 50 cm, field  $20 \times 20$ , filter 1 mm al., *i.e.*, in human, erythema dosage 10-min. = 2 E.D., 5-min. = 1 E.D. The tubers were placed with the cut side down and sprouts up when irradiated. Sprouts were just beginning to develop at the time of exposure and the tubers were planted in the field on the following day. Each "seed" piece was cut to a weight of thirty grams using the "bud" end, and the pieces were spaced nine inches in the row. The corresponding treated and untreated pieces were planted in adjoining rows thirty-two inches apart. The soil used was Sassafras sandy loam of good fertility, and a 5-8-7 fertilizer was used at the rate of 1,000 pounds per acre. Ordinary tillage was practiced and the plants were dusted

periodically with lead arsenate to control the potato beetle. The crop was harvested by hills after the vines were dead, and each tuber was weighed separately.

Plants from the lot of tubers receiving the ten-minute exposure produced only 84.4 per cent. as many tubers of all sizes as the untreated controls, and only 89.6 per cent. as many tubers weighing over forty-five grams each. Although the total weight of all tubers was reduced 6.0 per cent. by the treatment, the total weight of tubers weighing over forty-five grams each was increased 6.1 per cent. The average weight per tuber of marketable stock (over forty-five grams per tuber) was 81.6 grams for the lot irradiated ten minutes, as compared with 68.9 grams for the untreated lot.

Plants from the lot of tubers irradiated five minutes produced 104.7 per cent. as many tubers of all sizes as the controls; and 105.1 per cent. as many tubers weighing over forty-five grams each. The total weight of all tubers was increased 3.0 per cent. by the treatment, and the total weight of marketable tubers was increased 3.8 per cent. The average weight per tuber of marketable stock was 74.7 grams for the lot treated five minutes, as compared with 73.7 grams for the corresponding untreated lot.

The ten-minute irradiation caused the first leaves of the plants to assume a peculiar shape. The leaf tips appeared to have been injured and the blade was pinched-in as it approached these lesions. The margins of the leaf curled downward, and the leaf in general seemed to be somewhat more glossy than normal leaves. Subsequent leaves of these plants were normal. After formation of normal leaves the plants were vigorous, and remained green several days later than untreated plants at time of maturity. No striking abnormalities resulting from irradiation were noted in the harvested tubers. Irradiation for five minutes produced no apparent modification of plants or tubers.

These results indicate that strong dosages which cause definite lesions on leaves may also reduce the number of tubers formed; but such tubers may attain a greater size, so that yields of marketable stock are not lowered. It seems likely that still stronger dosages may reduce tuberization still further, and perhaps the yield of marketable stock as well. Further experiments of this nature are being planned.

HOWARD B. SPRAGUE

COLLEGE OF AGRICULTURE  
RUTGERS UNIVERSITY

MAURICE LENZ

MONTEFIORE HOSPITAL  
RADIUM CLINIC  
NEW YORK CITY

<sup>1</sup> Czapek, "Biochemie der Pflanzen," II, 411, 1920.

<sup>2</sup> Journal Series paper of the New Jersey Agricultural Experiment Station, department of agronomy.

<sup>2</sup> E. L. Johnson, "Tuberization of Potatoes Increased by X-rays," SCIENCE, 68: 231, 1928.