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THE USE OF POTASSIUM SALT OF INDOLE BUTYRIC ACID (KIBA) IN ROOTING AVOCADO CUTTINGS

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In an earlier study (2) on the effect of some plant hormones on the rooting capacity of avocado cuttings, the highest rooting percentage was obtained with KIBA; this material also had the best effect on the number and distribution of the roots on the cuttings. There were, however, differences in results due to the different concentrations of the hormone used and due to the types of the cuttings. The highest rooting percentage (70%) was obtained with the relatively easy-to-root Mexican-type cuttings when the highest concentration of KIBA (500 ppm) was used; with the difficult-to-root West Indian-type cuttings, the highest rooting percentage (60%) was obtained with the lowest concentration of KIBA tested (10 ppm).

In order to determine the optimum concentration of KIBA for rooting, it was necessary to carry out additional experiments, with a larger number of cuttings per each treatment. Furthermore, since it had been found (1) that the season in which the cuttings were taken had a marked effect on their rooting capacity, it was decided to carry out the experiments in different seasons.

Materials and Methods

The first experiment was carried out during a 9-month period from early August 1969 to early May 1970. On August 7, 1969, 200 terminal cuttings were taken: 100 cuttings from a 5-year-old Mexican-type GA-13 tree, and 100 cuttings from a 3-year-old West Indian-type Fuchs-20 tree.

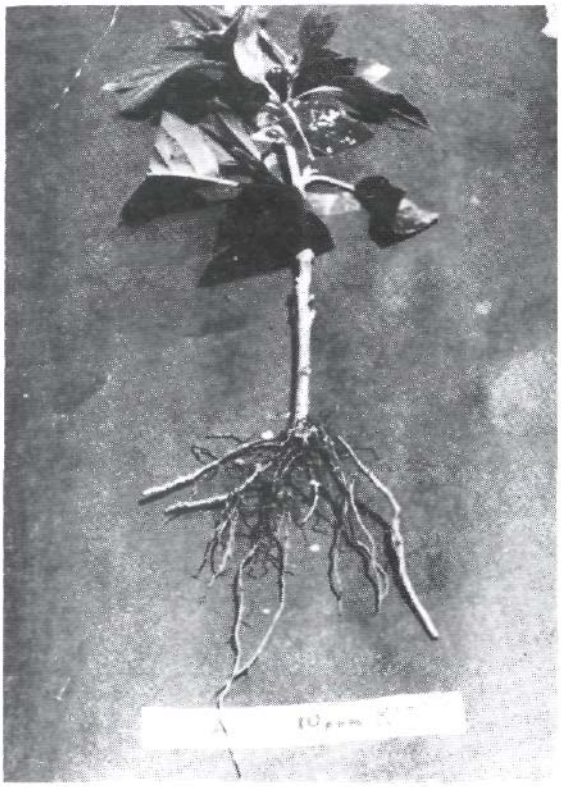
All the cuttings were 6-month-old semi-hardwood of the early spring season growth. The cuttings of each type were divided into four uniform groups of 25 cuttings each.

The cuttings were cut to a length of 25 cm, and the leaves from the basal 10 cm were removed. The cuttings of each group were then treated by dipping their bases for 24 hours in aqueous solutions of KIBA, at concentrations of 0, 10, 100 and 500 ppm.

On August 8, the cuttings were removed from the solutions and their bases were imbedded to a depth of about 8 cm into a coarse (No. 6 grade) vermiculite substrate in well-drained concrete beds (250x75x 30cm deep) constructed in a glass house. The cuttings were set 12x12 cm apart (Plate 1). Immediately after the insertion of the cuttings, an intermittent mist spray was operated for a period of 4 seconds in a 90-second cycle during the daytime.

The first survey for rooted cuttings was conducted on October 19, 1969, and the second a month later. On December 12, 1969, after the temperature of the rooting media had dropped below 20°C, all live cuttings were transferred to new concrete beds, which were electrically bottom-heated to 25°C. The third survey of the cuttings was carried out on February 2, 1970, and the fourth and last survey on May 5, 1970.

General view of avocado cuttings in rooting bed.



G.A.-13 rooted cutting treated with 10 ppm KIBA. (Note the well-distributed root system around the cutting base).

The second experiment was started in December 1969 and lasted until July 1970. Four hundred terminal semi-hardwood cuttings of the summer season growth (8 months old) were taken for this experiment on December 7: 200 cuttings were of the Mexican-type G.A.-13, and 200 of the West Indian-type Fuchs-20. The cuttings of each type were divided into eight uniform groups of 25 cuttings each. The cuttings were then prepared and treated (in two replicates) with KIBA solutions at the same concentrations and in the same manner as in the first experiment.

On December 8, all cuttings were inserted into the rooting media in the concrete beds, which were supplied with an electric wire bottom-heating apparatus kept constant at 25 °C. Intermittent automatically controlled mist spray supplied the high humidity necessary for the rooting of the cuttings.

The first survey for rooted cuttings was carried out on February 22, 1970 (about 10 weeks after the beginning of the experiment). Four more surveys were carried out at 5-week intervals.

Results and Discussion

The number of rooted cuttings and the development and distribution of roots in the various treatments were checked during each survey. The results of the first experiment (summer season) are given in Table 1.

The results of the second experiment (winter season) are given in Table 2.

The results of these experiments indicate that in most cases the Mexican-type G.A. 13 roots better and faster than the West Indian-type Fuchs-20, in agreement with results obtained in previous experiments (1, 2). There was a much higher rooting percentage of the cuttings taken in the late fall (second experiment) than in the summer (first experiment), in agreement with the results of previous experiments (1).

A different effect of KIBA treatment was found among the different types of cuttings and according to the various concentrations used. Generally it seems that the optimal concentration of KIBA is between 10 and 100 ppm, but the West Indian (difficult-to-root type) responded better to the lowest KIBA concentration used (10 ppm) and the Mexican (easier-to-root type) responded better to the intermediate concentration (100 ppm). Apparently, the highest concentration tested (500 ppm) is too high, since in most cases the rooting percentage following this treatment was the lowest.

Table 1: NUMBER AND PERCENT OF ROOTED CUTTINGS ACCORDING TO TREATMENT (SUMMER)

KIBA Treatment	Survey Date: Oct. 19, 1969		Nov. 17, 1969		Feb. 15, 1970		May 7, 1970	
	G.A. - 13							
(ppm)	No.	%	No.	%	No.	%	No.	%
0	0	0	0	0	1	4	1	4
10	0	0	0	0	1	4	1	4
100	4	16	7	28	10	40	10	40
500	2	8	6	24	8	32	8	32
	Fuchs 20							
0	0	0	0	0	1	4	5	20
10	0	0	0	0	4	16	9	36
100	0	0	0	0	3	12	8	32
500	0	0	0	0	0	0	0	0

Table 2 NUMBER AND PERCENT OF ROOTED CUTTINGS ACCORDING TO TREATMENT (WINTER) 1970

KIBA Treatment (ppm)	Survey Date: Feb. 22		March 29		May 7		June 15		July 21	
	No.	%	No.	%	No.	%	No.	%	No.	%
	G.A. - 13									
0	9	18	29	58	41	81	44	88	46	92
10	1	2	13	26	31	62	37	74	45	90
100	16	32	35	70	39	78	45	90	46	92
500	9	18	28	56	35	70	37	74	37	74
	Fuchs 20									
0	1	2	11	22	18	36	21	42	21	42
10	3	6	12	24	18	36	23	46	27	54
100	9	18	17	34	24	48	25	50	26	52
500	6	12	8	16	10	20	10	20	10	20

Many cuttings in the first experiment were found to have rotten bases already at the first survey, which was carried out about 10 weeks after the start of the experiment.

The number of degenerating cuttings was especially high among the Fuchs-20 500 ppm KIBA group. This blackening and roting of the cutting bases might have been a result of too-high moisture together with high temperature of the rooting substrate during the summer, which may explain, at least partially, the generally low rooting percentage of the first experiment. Since, however, cuttings taken during the summer show slower and lower rooting percentage even when they are not attacked by any fungi, compared with the cuttings taken in the late fall or winter, it seemed important to investigate some other possible reasons for the degeneration. One possibility is the existence of various endogenous rooting promoters or inhibiters in the cuttings taken at different seasons. This is now being investigated by extracting such possible materials from easy-and difficult-to-root cuttings of various types in different seasons and testing them with bioassay methods.

LITERATURE CITED

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