

# INDUCTION OF PARTHENO-CARPY WITH N-ARYLGLYCINES

Akira TAKEDA and Jiro SENDA

It is well known that the parthenocarpny can be induced artificially in many plants by the use of plant growth substances. The efficacy finds its practical use in setting seedless fruits of plants. As for N-arylgylicine, any example of such a practical application has scarcely been known, except that N-( $\beta$ -naphthyl)glycine is described as ineffective for inducing parthenocarpny in tomato (Walker, 1948). Since it has been shown, however, in the previous paper (Takeda, 1954) by means of the pea test, the Aduki test and the *Avena* cylinder test that many of N-arylgylicines exhibit primary growth activities, these compounds may be expected to be efficacious also in the practical use. The applicability of N-arylgylicine for the purpose was now tested using compounds which possess a comparatively high growth activity among the homologues.

The present paper describes the results of the experiment conducted from the above-mentioned view, using two N-arylgylicines and two nitriles, i. e. N-(3-chlorophenyl)glycine, N-(2,4-dichlorophenyl)glycine, N-(2,4-dichlorophenyl)glycinonitrile and N-(3,4-dichlorophenyl)glycinonitrile.

Tables 1, 2 and 3 show the results obtained from the experiment with N-(2,4-dichlorophenyl)glycine. The data concerning the compounds other than this had been omitted, however, because all of the flower buds treated by them fell down within a few days.

TABLE 1

Induction of parthenocarpny of egg plant <sup>a</sup> (*Solanum Melongena* L. var. *oblongo-cylindricum* HARA) by N-(2,4-dichlorophenyl)glycine <sup>b</sup>

Concentration, %	Number of				Per cent [set]
	flower buds treated	flowers which dropped after the treatment	under- developed fruits	fruits gathered	
0.1	7	5	2	0	0
0.5	8	3	5	0	0
1	9	2	4	2 <sup>o</sup>	25
2	9	1	1	7 <sup>d</sup>	78
4	8	1	1	6 <sup>e</sup>	75

<sup>a</sup> The stigma was left intact. <sup>b</sup> Diethylamine salt of N-(2,4-dichlorophenyl)glycine was employed in the experiment. <sup>c, d, e</sup> The fruits gathered, weighed [c] 45.6, [d] 110.9, [e] 101.9 g., on the average, respectively.

TABLE 2

Induction of parthenocarpy of egg plant <sup>a</sup> (*Solanum Melongena*  
L. var. *depressum* BAILEY) by N-(2,4-dichlorophenyl)glycine <sup>b</sup>

Concentration, %	Number of				Per cent [set]
	flower buds treated	flowers which dropped after the treatment	under- developed fruits	fruits gathered	
0.1	11	9	2	0	0
0.5	11	5	6	0	0
1	11	4	7	0	0
2	16	3	5	8 <sup>c</sup>	50
4	11	2	5	4 <sup>d</sup>	36

<sup>a</sup> The flowers were emasculated one day before anthesis. <sup>b</sup> Diethylamine salt of N-(2,4-dichlorophenyl)glycine was employed in the experiment. <sup>c, d</sup> The fruits gathered, weighed [c] 83.5, [d] 87g. on the average.

TABLE 3

Induction of parthenocarpy of egg plant <sup>a</sup> (*Solanum Melongena*  
L. var. *depressum* BAILEY) by N-(2,4-dichlorophenyl)glycine <sup>b</sup>

Concentration, %	Number of				Per cent [set]
	flower buds treated	flowers which dropped after the treatment	under- developed fruits	fruits gathered	
0.1	10	3	6	1 <sup>c</sup>	10
0.5	9	3	2	4 <sup>d</sup>	44
1	10	2	3	5 <sup>e</sup>	50
2	10	4	1	5 <sup>f</sup>	50
4	10	3	3	4 <sup>g</sup>	40

<sup>a</sup> The stigma was left intact. <sup>b</sup> Diethylamine salt of N-(2,4-dichlorophenyl)glycine was employed in the experiment. <sup>c, d, e, f, g</sup> The fruits gathered, weighed [c] 62.0, [d] 77.3, [e] 61.3, [f] 89.5, [g] 99.5g., on the average, respectively.

The results indicate that two nitriles, which have no primary growth activity, are ineffective for inducing parthenocarpy. Both N-(3-chlorophenyl)glycine and N-(2,4-dichlorophenyl)glycine are known to possess primary growth activity, but only the former was found to be useful for setting the parthenocarpic fruits of egg plant, while the latter, which is of lower potency in growth test, lacked the efficacy.

The average weight and the percentage of parthenocarpic fruits set vary with the manner of treatment and the variety of plant. The fruit developed from an untreated flower of a form of *Solanum Melongena* L. var. *depressum* BAILEY weighed 339 g. on the average, while the parthenocarpic fruit of the

same form set with N-(2,4-dichlorophenyl)glycine, which was gathered, weighed only less than a third of that. The flesh of the latter, however, appeared so fine-grained.

### EXPERIMENTAL

*Materials.* The chemicals employed are the diethylamine salt of N-(3-chlorophenyl)glycine, the diethylamine salt of N-(2,4-dichlorophenyl)glycine, N-(2,4-dichlorophenyl)glycinonitrile and N-(3,4-dichlorophenyl)glycinonitrile. The preparation of these compounds will be reported later. The samples were mixed up with lanoline and applied to the plants as a lanolin paste.

*Biological testing for setting parthenocarpic fruits of egg plants.* The experiment was conducted from July to September, 1954, in essentially the same manner as described by Oiue (Oiue, 1938).

The stout seedlings of the two kinds of egg plant, viz. *Solanum Melongena* L. var. *depressum* BAILEY and var. *oblongo-cylindricum* HABA, were planted and grown in the farm. The flowers were emasculated one day before anthesis. The stigma of one half of these flowers were then cut off and the other half were left intact. Then, the pistils were treated uniformly, from the amputated section in the former and from the stigma in the latter, down to ovary, with a lanolin paste of diethylamine salt of N-(2,4-dichlorophenyl)glycine having such concentrations as 0, 0.1, 0.5, 1.0, 2.0 and 4.0 %, respectively, and the treated buds were covered with paraffin paper bags. Two days after the treatment, the bags were removed. The drop of flowers or fruits was examined 5 days, 15 days and 30 days after the treatment. The fruits were gathered 35 days after.

A most part of the treated flowers which did not bear fruits dropped within 5 to 7 days after the treatment and a goodly number of underdeveloped fruits the average weight of which was less than 2 g. was produced.

### SUMMARY

The efficacy of a few N-arylglycines and nitriles for setting parthenocarpic fruits has been investigated using egg plants as test materials. N-(2,4-Dichlorophenyl)glycine was found to be efficacious. The experiments here described may offer a preliminary knowledge in case where N-arylglycine is to be put to practical use for the purpose.

### LITERATURE

- Oiue, Y., 1938, *Nogyo oyobi Engei* (in Japanese), 13 : 2215.  
Takeda, A., 1954, *Rept. Ohara Inst. Agr. Biol.* (in Japanese), 42 : 19.  
Walker, R. D., 1948, his thesis, University of London.