

BRIEF COMMUNICATION

The Effect of Morphactin on Cauliflower Curd-Formation

M. ILYAS* and BHASKAR BARMA

University Gardens, University of Delhi

Received May 10, 1972

Abstract. Cauliflower plants in the juvenile phase treated on the leaf surface and at the apex with Morphactin solution (100 mg l^{-1}) and this concentration failed to develop a curd and also to come to flowering. Instead of a curd the axis formed a conical or dome-shaped structure bearing 'nodal' rings. The number of rings increased with growth of the axis which either formed or did not form a small curd-like structure, which generally dried without flower formation.

The longitudinal growth of the shoot axis, the laying down of primordia and the formation of shoot organs and flowers are influenced by Morphactins. The severity of the action depends on the object and its stage of development (SCHNEIDER 1970). The present study was made to find out the effect of Morphactin (Chlorflurenol, IT-3456) on the curd-formation of cauliflower.

Six weeks old (9–11 leaved) plants of *Brassica oleracea* L. var. *botrytis* DC. cv. Snowball, raised 45 cm apart in the field, were dabbed on the lamina with an absorbent cotton swab soaked with aqueous Morphactin solution, and the shoot apex was thoroughly wetted with it. The concentrations used were 100 mg, 250 mg, 500 mg and 1 000 mg per litre (+0.02% Tween 80-as surfactant). One control set was treated with the surfactant only whilst the other set remained without treatment. Ten plants were used for each treatment.

Six weeks after the treatment small curds could be seen on the control plants, whilst the treated plants had their apical leaves tightly covering the apex. A week later the curds still did not emerge from the apical leaves. Plants treated with lower doses had a spreading but tightly-covered top. On forcibly parting the leaves at the top of the treated plants, small white, conical structures were observed. These 'cones' were marked by 'nodal' rings which were sometimes incomplete or interrupted, and the number of these rings increased with the longitudinal growth of the conical axis. These rings did not give rise to any structure except, rarely a few 'bracts'. The number of the conical axes at $1\,000 \text{ mg l}^{-1}$ was 1–2, at 500 mg l^{-1} , 1–5, at 250 mg l^{-1} 1–16, and 100 mg l^{-1} 1–35 (Fig. 1).

Some of the conical axes 8 weeks after treatment gave rise to very small curd-like structures (Fig. 2), whilst a few remained dome-shaped *i.e.* without

* Address for correspondence: 1250, Ballimaran, Delhi-6, India.

forming any structure. In a few cases two 'cones' fused congenitally at the base and continued growing free at their respective growing points. With the lower doses one or three 'cones' were observed enclosed in one or three bracts. These bracts had a broad, thickened midrib and the lamina was developed considerably. Because of confinement by the bracts (most of the 'cones'), rotted at the tip or dried when the bracts were cut off to ease the emergence of the 'cones'. The exposed 'cones' developed chlorophyll. The controls came to flowering 22 weeks after sowing.

SADIK (1962) studied the morphology of cauliflower curd and reported that it has lateral, a non-fasciated and non-hypertrophied first order branches which arise acropetally in spiral succession from the apex of the main shoot. The initiation of higher orders of branches continues to take place according to $5 + 8$ phyllotaxy, adding to the size of the curd and its compact development. Bracts are present throughout. The functional flowers arise on branches from below the curd. He also determined the juvenile phase of 'Snowball M' up to 24 true leafed stage.

In the present case it was found that Morphactin (Chlorflurenol) inhibited longitudinal growth of the axes at all the concentrations used. At higher doses (500 and 1 000 mg l⁻¹) the lateral axes were suppressed, but they were permitted to grow at lower doses (100 and 250 mg l⁻¹) apparently arising from around the same spot rather than being spirally arranged at different loci. This was possible because of the reduction in internodal length, which is usually caused by Morphactins. The number of lateral axes permitted to grow, however, was low (34) as compared with that of the controls (50—100). The bracts in the treated plants were able to develop considerably because of the absence of curd top which "in nature" certainly prevents their growth. The bracts at higher doses were also small and mishapen.

VON DENFFER *et al.* (1969) studied the effect of chlorflurenol on flower formation in explants of *Begonia* × *richmondensis* *in vitro*. The suppression of flower organs and of entire flowers increasing with concentration was observed. In this case again it was found that primordia, which were later to give rise to branches, pedicels, abortive flowers and also functional flowers, fuse to form the 'nodal' rings and fail to differentiate or develop any further. The curd-like structures produced also fail to flower. It is evident that morphactin has an adverse effect on curd development. Anatomical studies are in hand and shall be reported in due course.

Acknowledgements

The authors express their gratefulness to M/s E. Merck AG Darmstadt for a sample of Morphactin and Dr. V. P. Singh, Secretary, University Garden Committee, University of Delhi, and Professor H. Y. Mohan Ram, Department of Botany, University of Delhi for constant encouragement and facilities.

References

- DENFFER, D. VON, RINGE, F., FRICKE, G.: Durch 2-chlor-9-hydroxyfluorene carbonsäure-(9)-hervorgerufene morphogenetische Effekte bei *Stypocaulon scoparium* und bei *Begonia* × *richmondensis*. — Ber. deut. bot. Ges., Vortr. Gesamtgeb. Bot., N. F. 3 : 61—68, 1969. Cited in SCHNEIDER (1970).
- SADIK, S.: Morphology of curd of cauliflower. — Amer. J. Bot. 49 : 290—297, 1962.
- SCHNEIDER, G.: Morphactins: physiology and performance. — Annu. Rev. Plant Physiol. 21 : 499—536, 1970.