The bioassay study revealed that a concentration of 2 mg and above of the triterpenoid glycoside inhibited beetle feeding completely and this emphasises the chemical aspect of insect host relationship. While cucurbitacins, the tetracyclic triterpenes widely distributed in cucurbitaceae, are specific feeding attractants of the red pumpkin beetles[3,4], the triterpene derivatives of *M. charantia* act as a feeding inhibitor of the same species. This contrasting feeding response of the above triterpenoids may be due to differences in their chemical structure. Studies on the structure-activity relationship of the various cucurbitane derivatives could throw light on the functional group responsible for inhibition or stimulation of insect feeding.

The authors are grateful to Dr. K. L. Chadha, Director, for facilities. They are indebted to Dr. H. Okabe, Fukuoka University, Japan, for providing standard samples of momordicosides A and B. Thanks are also due to Miss Akellavani for providing the plant material and to Dr. R. Krishnan for assistance.

18 August 1982

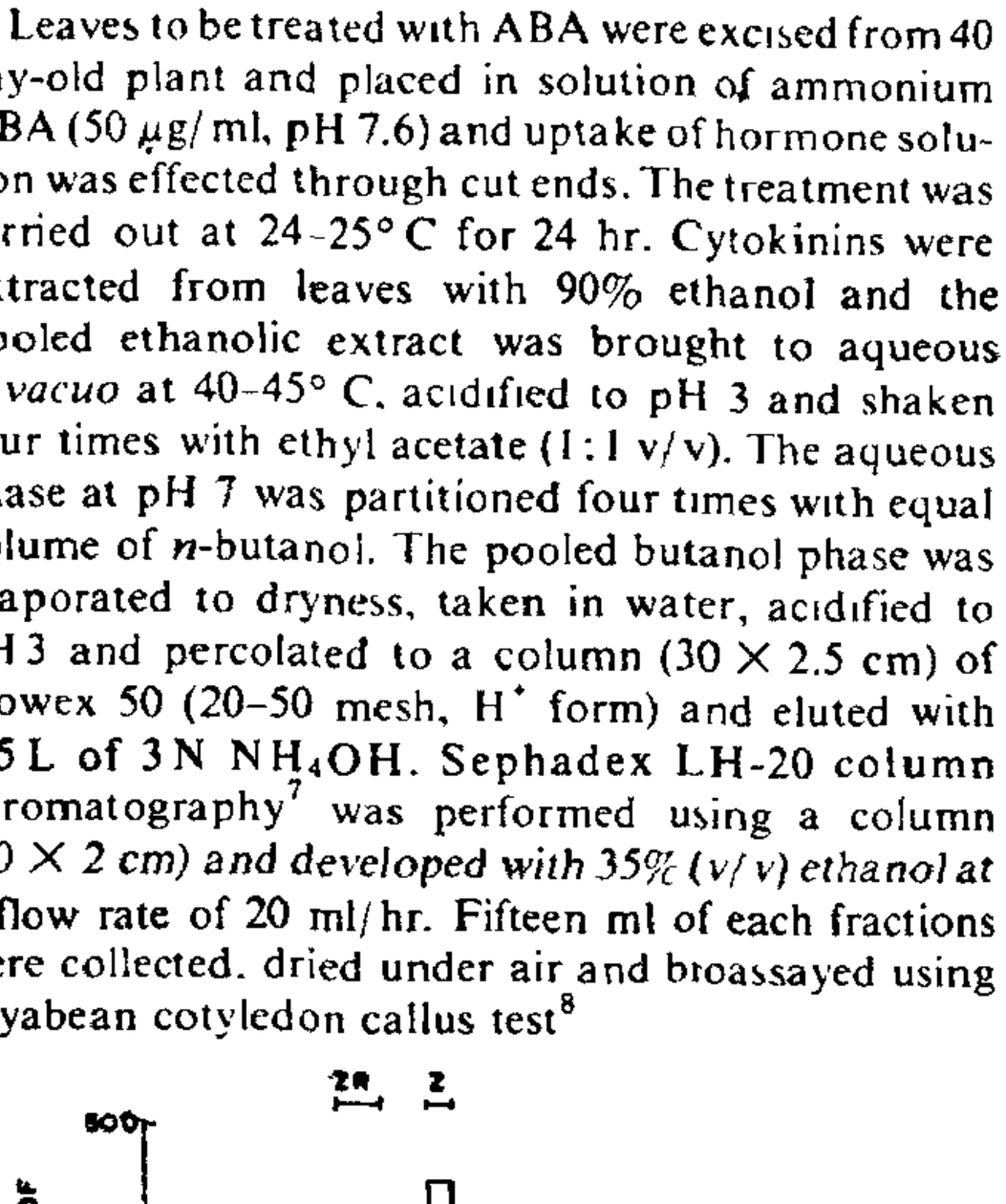
1. Nath, P. and Thakur, M. R. *Indian J. Hort.*, 1965, **22**, 330.
2. Okabe, H. Miyahara, Y., Yamauchi, T., Miyahara, K. and Kawasako, T., *Chem. Pharm. Bull.*, 1980. **28**, 2753.
3. Chambliss, O. L. and Jones, C. M., *Proc. Am. Soc. Hort. Sci.*, 1966. **89**, 394.
4. Sinha, A. K. and Krishna, S. S., *J. Econ. Ent.*, 1969, **62**, 512.

EFFECT OF ABSCISIC ACID ON ENDOGENOUS CYTOKININS IN RICE (*ORYZA SATIVA* L.) LEAVES

SHYAMALI SAHA, P. K. NAGAR AND P. K. SIRCAR
Department of Botany, University of Calcutta, 35, Ballygunge Circular Road, Calcutta 700 019, India.

As a natural growth substance, abscisic acid (ABA) has been identified acting as an inhibitor in various biological systems[1,2] and counteracting responses induced by other plant hormones[3,4]. ABA and cytokinin have been reported to counteract the effects of each other in several plant systems and at certain proportions ABA reportedly even promotes growth callus tissues[5,6]. In the present paper the direct influence of abscisic acid on the endogenous cytokinin activity in leaves of rice *Oryza sativa* L. is presented and discussed.

Leaves to be treated with ABA were excised from 40 day-old plant and placed in solution of ammonium ABA (50 μg/ml, pH 7.6) and uptake of hormone solution was effected through cut ends. The treatment was carried out at 24–25° C for 24 hr. Cytokinins were extracted from leaves with 90% ethanol and the pooled ethanolic extract was brought to aqueous *in vacuo* at 40–45° C, acidified to pH 3 and shaken four times with ethyl acetate (1 : 1 v/v). The aqueous phase at pH 7 was partitioned four times with equal volume of *n*-butanol. The pooled butanol phase was evaporated to dryness, taken in water, acidified to pH 3 and percolated to a column (30 × 2.5 cm) of Dowex 50 (20–50 mesh, H^+ form) and eluted with 1.5 L of 3N NH_4OH. Sephadex LH-20 column chromatography[7] was performed using a column (40 × 2 cm) and developed with 35% (v/v) ethanol at a flow rate of 20 ml/hr. Fifteen ml of each fractions were collected, dried under air and bioassayed using soyabean cotyledon callus test[8]



Figures 1&2. Separation of cytokinin activity following Sephadex LH20 column chromatography of Dowex 50 eluate of **1.** untreated leaf material; **2.** leaf material after ABA (50 μg/ml) treatment. Quantity equivalent to 25 g fresh weight of leaf tissue was chromatographed on Sephadex LH20 column. The elution patterns of zeatin (Z) and zeatin riboside (ZR) are shown by horizontal bars over the histogram.

Growth promoting activity was evident in the Dowex 50 eluate of both the treated and untreated materials. An aliquot of this eluate of both the treated and untreated material was taken up separately in 1.5 ml of 35% ethanol and fractionated through Sephadex LH-20 column. Following fractionation, three different zones of cytokinin activity in the untreated material could be evident, eluting at fraction 6–7, fraction 9–10 and fraction 12–13 (figure 1). The last two peaks were eluted at fractions corresponding to elution volume of zeatin riboside and zeatin respectively. With all the probability the cytokinin activity of fraction 6–7 seems to be cytokinin glucoside presumably zeatin glucoside since after treating it with β-glucosidase[9] the conversion product shifted to the position of synthetic zeatin. Following treatment with ABA, the cytokinin activity of leaves was considerably reduced. The reduction in growth activity was more prominent with respect to the latter two peaks than the former one (figure 2). Thus it seems that the effect of ABA has been more pronounced on the factors having the elution volume corresponding to those of zeatin and zeatin riboside and less in cytokinin glucoside.

In some cases a direct antagonism between cytokinin and ABA has been demonstrated while in others these hormones have opposite effects. Exogenous ABA has been reported to suppress the degradation of kinetin to adenine in *Rumex* leaves[10]. This seems to support the conclusion of Mullins and Osborne[11] who suggested that ABA has a "cytokinin sparing" effect and thereby stimulate a plant process. This is supported by the promotive effect of ABA in some systems[6, 10]. In the present study the reduction in cytokinin activity following ABA treatment was very much pronounced on the substances having the elution pattern of zeatin and zeatin riboside and to lesser extent on the cytokinin glucoside. It is noteworthy that ABA suppressed the reduction of zeatin side chain in bean axis and the amount of dihydrozeatin riboside and nucleotide formed being greatly reduced[12]. The interaction between cytokinin and ABA may also take place at the level of translation and enzyme synthesis. The α-amylase synthesis in the cereal grains mediated by gibberellins paralled coleoptile growth and both these processes have been shown to be inhibited by ABA and reversed by cytokinin but not by gibberellins[13, 14] Thus ABA affects both nucleic acid and protein metabolism by exerting its primary response at the nucleic acid level and then by translation and transcription on protein synthesis[15, 16]

Financial assistance to SS and PKN from CSIR New Delhi is greatfully acknowledged.
16 July 1982

1. Addicott, F. T. and Lyon, J. L., *Annu. Rev. Plant Physiol.*, 1969, **20**, 139.
2. Milborrow, B. V., *Planta*, 1966, **70**, 155.
3. Galston, A. W. and Davis, P. J., in *Control mechanism in plant development*, Prentice Hall, Englewood Cliffs, New Jersey, 1970.
4. Thomas, T. H., Wareing, P. F. and Robinson, P. M., *Nature* (*London*), 1965, **205**, 1270.
5. Altman, A. and Goren, R., *Plant Physiol.*, 1971, **47**, 844.
6. Blumenfeld, A., and Gazit, S., *Plant Physiol.*, 1970, **45**, 535.
7. Armstrong, D. J., Burrows, W. J., Evans, P. K., and Skoog, F., *Biochem. Biophys. Res. Commun.*, 1969, **37**, 451.
8. Miller, C. O., *Ann. N. Y. Acad. Sci.*, 1967, **144**, 251.
9. Van Staden, J., *Physiologia Plant*, 1976, **36**, 123.
10. Back, A., Bittner, S. and Richmond, A. E., *J. Exp. Bot.*, 1972, **23**, 744.
11. Mullins, M. E. and Osborne, D. J., *Aust. J. Biol. Sci.*, 1970, **23**, 479.
12. Sondheimer, E. and Tzou, D. S., *Plant Physiol.*, 1971, **47**, 516.
13. Khan, A. A. and Downing, R. D., *Physiologia. Plant*, 1968, **21**, 1301.
14. Khan, A. A., *Physiologia. Plant*, 1969, **22**, 94.
15. Seitz, K. and Lang, A., *Plant Physiol.*, 1968, **43**, 1775.
16. Trewaves, A., *Plant Physiol.*, 1972, **49**, 47.

PRELIMINARY STUDY OF THE HANDEDNESS IN FIRST LEAF AND SUCCESSIVE LEAVES, FLAG LEAVES AND SPIKELETS IN *TRITICALE* AND ITS PARENTS.

N. Rama Swamy and Bir Bahadur
Department of Botany, Kakatiya University, Warangal 506 009, India.

Compton[1, 2] studied the seedling handedness in *Secale cereale* and several other cereals. Seedling characters in flowering plants in general and monocotyledons in particular have been studied in recent years but seedling handedness has not been recorded[3]. Recently, Bahadur *et al.*[4] have studied the seedling handedness in *Ikmbusa arundinacea* and several Gramineae (unpublished) Bahadur and Rama Swamy (unpublished) reported the seedling handedness in *Triticale* and its parents. In continua-