ADVANCES IN PLANT HORMONES

WILLIAM J. GREENHALGH

Department of Agronomy and Horticultural Science
University of Sydney
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Research and development activities involving plant hormones contribute significantly to the information explosion. This seems to be especially true of horticultural crops where even minor manipulations of the natural sequence of growth and development produce substantial benefits either aesthetically or commercially.

Sifting through the rubble of this explosion of information, one can observe some pattern emerging to indicate that mans' knowledge (i.e. organized information) and mans' wisdom (i.e. his use of that knowledge) are making slow but steady progress. Plant physiologists classify the active agents into: (a) auxins, (b) gibberellins, (c) cytokinins, (d) inhibitors, and (e) ethylene.

In terms of their application to agricultural production, Weaver devotes separate chapters to: (a) rooting and propagation, (b) dormancy, (c) flowering, (d) fruit set and development, (e) senescence (f) abscission, (g) size control and related phenomena, and (h) weed control. Clearly the matrix of the five chemical agents, alone or in combination, on the eight plant growth phenomena, provide a complex system even within the one plant species, not to mention the multitude of species with which we are concerned in commercial crop production. The first lesson we learn is that what works admirably in one situation may not work at all or may even give the opposite response in another plant or crop situation.

In the face of increasing demands for accountability in the use of resources, including the resource of scientific manpower, it is well to consider attitudes that may develop in regard to the end-uses to which plant hormones are directed.

Herbicides, once universally acclaimed as the saviour in man's fight to produce more food, have lost some respectability in the hands of military strategists or with amateur enthusiasts in urban and fringe-urban environments.

In plant propagation, simple compounds in small doses have been a boon to nurserymen, but the volume of trade in these products suggests that the cost of continued research and development must be borne by the user of the product, not the manufacturer or supplier.

Chemicals used to regulate flowering, fruit set, growth, de-

velopment and form must continue to be regarded as short term answers to problems that must be resolved, ultimately, by genetic means. Plant breeders need time to develop crops of the stature, timeliness, productiveness and with the product quality that the market demands. In perennial crops, where this time span is long, we can expect growth substances to be used extensively to remedy deficiencies in the existing genotypes. In these crops, control of vegetative growth, initiation of flowering, control of fruit size and fruit development are still the areas offering most potential for the use of growth regulating sprays. In some cases, the end results are blatantly cosmetic; degreening of citrus, colour promotion in tomatoes, shape of apples. In other cases these chemicals are being used as corrective therapeutants, to induce tolerance to aerial pollutants, salt and other contaminants of water and the soil. In the public eye, these uses are the least easy to justify.

Controlling the time of ripening or the time of abscission of leaf, fruit or buds, would seem to be of lasting significance to agriculture, and especially horticulture. It seems unlikely that these phenomena can be controlled genetically with the degree of precision required by nurserymen, orchardists or farmers having to programme crops for machine processing. The recent phenomenal interest in the use of ethylene-releasing sprays attests to this need.

Control of senescence by chemicals appeals to the producer of non-edible (ornamental) crops, but because of the hitherto association between senescence inhibitors and cell-division factors, it has remained largely of academic interest in food crops. Control of the thermal and gaseous environments (controlled atmospheres and cool storage) proves to be a more acceptable alternative.

When the dust settles, what can we expect to see as the permanent gain from the explosion of published information on plant hormones? I think they will be these:

(1) An appreciation of herbicides as no more than a strategic weapon in the fight for crop protection.

(2) The small, but continuing use of chemicals for the propagation of tissues, cells and cuttings; also for the induction of and the release from dormancy of storage bulbs, buds, etc.

(3) The production by plant breeders of cultivars having attributes already proven to be advantageous. In this respect, growth regulating substances permit the manipulation of existing cultivars in a way that allows their evaluation by the market in advance of their permanent introduction.

(4) Chemical control of ripening and abscission in those industries where precision in programming is an essential element of production.

(5) Increased use of environmental control rather than chemical treatment to inhibit senescence of crop produce.

(6) Some use of plant hormones as plant cosmetics and as remedial therapeutants in adverse or polluted environments. Not all communities will be able or agreeable to afford this luxury.

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