ABSTRACT.

While in the vast majority of the plants synthetic auxins in their physiological concentrations cause inhibition or delayed flowering, their effect in pineapple and litchi is found to be sharply different in that the flowering of these plants is very much augmented after application with them. This has caused a growing interest in the field of flowering of plants in general and that of pineapple plant in particular. The other pertinent question lies in auxin-synthesis mechanism existing in the stem apex and leaf bases of this plant (Gordon & Nieva, 1949; van Overbeek, 1946); from auxin precursors indole acetaldehyde, to indole acetic acid (IAA), the only native auxin of plants so far discovered. The logical conclusion is that the flowering of pineapple is an auxin controlled process. This conclusion, however, appears to suffer from inconsistency owing to the fact that acetylene and ethylene, two unsaturated hydrocarbons also exert an identical influence on induction of early flowering in this plant (Rodriguez, 1932). These contrasting reports make the problem much more fascinating. With the main object of elucidating the mechanism of auxin action in the flowering and fruit formation of this plant, the present investigation was undertaken. The other associated problem lies in examining the quality of fruits likely to be improved after treatment with auxins.
Pineapple plants of variety Giant Kew as selected for the purpose, since in the preliminary trial experiments conducted in the experimental farm of Agricultural Botany, this variety proved superior over the other varieties in its response to auxin application. Auxin NAA was first applied to the stem apex and leaf bases in aqueous solution using two sets of concentration ranges, in the first set relatively dilute concentrations from 50 to 200 ppm. were used, and in the second set higher concentrations from 250 to 1,000 ppm. were employed for clear appraisal of the optimal and inhibitory level of concentrations. The results revealed that optimal level lies somewhere between 50 to 100 ppm., and with further rise in concentration up to 200 ppm., the NAA action maintained a steady level without fluctuation, but with still further rise to 1,000 ppm., a progressive falling trend in the flower number was evident culminating in nearly suppression of flowering at 1,000 ppm.

The results with 2,4-D, which was shown to be promoter of flowering in this plant by van Overbeek, were always found to be inhibitory even with dilute concentration of the order 10 to 100 ppm. in contrast to van Overbeek's finding, reasoning perhaps being a wide variation in the climatic condition of Assam and Florida. IAA used in the above range of 2,4-D proved ineffective. Smaller range of concentrations (10 to 100 ppm.) was used in case of other
auxins, namely, NOKA, IBA, GA and the results obtained did not show any improvement in regard to flowering and fruit formation (fruit weight and size). 2,4-D, 5-T even in low concentration caused certain abnormality in the growth of leaves. The activity of certain antiauxins, TIBA, MH, screened afterwards for this purpose also proved nearly ineffective, contrary to promotion of flower formation in tomato (Galston, 1947).

Acetylene and calcium carbide tried subsequently proved highly potent by inducing cent percent flowering in most cases after treatment with acetylene gas emulsion or solid calcium carbide, which liberated acetylene gas on coming in contact with moisture. Production of flowers in off-season was guaranteed irrespective of the age of the treated plants. The fruits were however, undersized with lesser weight but with compact tissues which did not rot easily. Interaction experiments were laid out using different sets of auxins, in one set there was, NAA and IAA, in the other NAA and 2,4-D, in still other NAA and MH. Effect of acetylene jointly with NAA was examined in the end. The concentrations used for studying joint action vary within the range from 5 to 200 ppm. in all possible concentrations. In the first set, the existence of antagonism of action between NAA and IAA was indicated. The effect of NAA in terms of flowering percentage was counteracted to a certain extent with IAA but
not vice-versa, which indicates lack of mutual antagonism. Similar antagonistic effect of 2,4-D upon NAA was visible. 2,4-D appeared to reduce in stimulatory action of NAA. The final results of NAA-MH interaction revealed slight depression in the number of flowers induced by NAA in presence of MH. There was, however, indication of earliness in flowering by about 10-12 days with mixture. Fruit maturity was delayed. The interaction of acetylene and NAA, the latter compound being applied about one week apart, imparted a picture of additive effect with the mixture than with individual compound acting alone. With higher concentrations of NAA, there was observed a tendency for counteraction of acetylene effect.

On the basis of the results incorporated in this thesis it may be concluded that the flowering of pineapple is not exclusively under the control of its native auxin. Some conditions like the removal of flowering inhibitor caused by NAA and acetylene alike may result in the induction of flowering in this plant. It may also be due to the activation and mobilisation of a specific metabolic substance other than auxin influencing flowering in this plant as aftermath of NAA and acetylene treatment. In the end it is to be
stated that NAA treated fruits were large in size carrying more weight over those without auxin treat-
ment (control). Synchronisation of flowering and fruit
ripening emerging from the application of NAA and acetyl-
ene was a striking result. Production of fruits by the
application of acetylene and calcium carbide all the
year round was ensured. Flowering season of this plant
is found to lie in February and March and fruit ripen-
ing in August-September.