Arg EXPRESSION IN RELATION TO EPICUTICULAR WAX DISTRIBUTION

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The gray-green leaves on argenteum (Arg) plants were shown by Hoch et al. (1) to result from the presence of extensive air spaces located between the leaf epidermis and parenchyma. At present, this is the only known effect of Arg. Hoch et al found nothing to show that surface wax was in any way involved in determining the characteristic gray-green leaf color. Removal of the surface wax of leaves modifies but does not fundamentally change Arg mutant expression. This can be demonstrated directly, by mechanically or chemically removing leaf wax, or indirectly, by incorporating mutants known to reduce epicuticular wax on the leaves. In the course of our investigations, Arg has been combined with nearly all the known wax mutants. In plants bearing the combination Arg wlo, for example, the upper surface of the leaflets are shiny and less gray-green than in Arg Wlo plants, but the presence of Arg is unmistakable.

Still, the gray-green color of Arg plants is not confined exclusively to the leaves but includes the stem and pods as well. The color contrast between mutant (Arg) and normal (arg) is, however, much less distinct in the stem and pods than in the foliage. Moreover, the gray-green color of stems and pods, unlike the leaves, disappears upon gentle rubbing, thus suggesting that Arg influences pod wax. Also, the pods of plants with the combination Arg wp are waxless and appear identical with pods borne on arg wp plants. In arg wel plants all parts (leaves, stems, and pods) have reduced wax. When Arg is added (i.e. Arg wel) the leaf parts show the modified expression of Arg similar to that on the upper surface of the leaflets of Arg wlo plants. However, the pods and stems of Arg wel plants are shiny green and phenotypically identical with pods and stems of arg wel plants. Fig. 1 depicts the interactions among Arg, wp and wel. These observations imply that Arg exerts an effect on stems and pods which is different from that on leaves, thus complicating the interpretation of gene action.

1. Hoch, H. C., Charlotte Pratt, and G. A. Marx. 1980. Amer. J. Bot. 67:905-911.

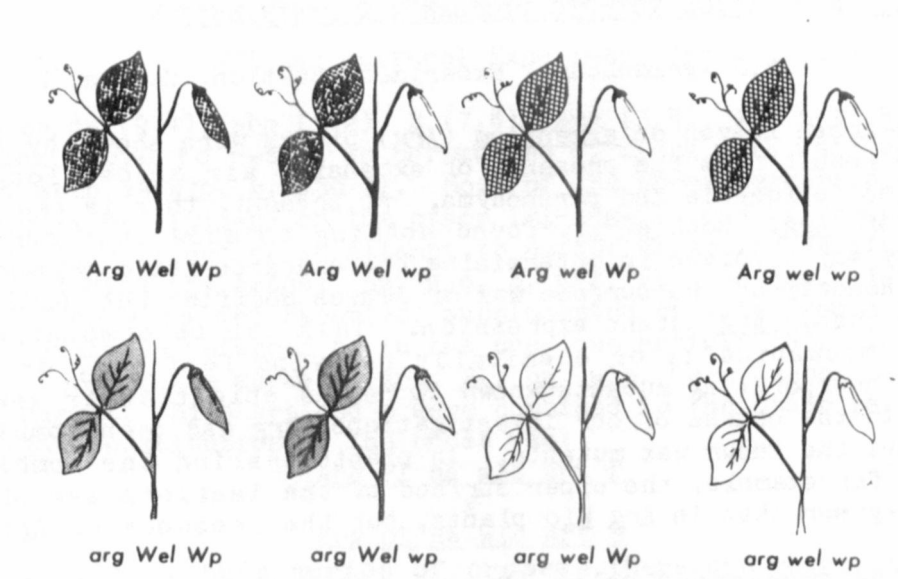

Fig. 1. A schematic illustration of the phenotypic effects on leaf and pod wax resulting from the interaction of Arg, wel. and wp. Shading indicates presence of wax; no shading indicates absence of wax. Fine crosshatching indicates effect of Arg on normal waxy tissue. Coarse crosshatching indicates effect of Arg on waxless leaf tissue. Note that in Arg wp and Arg wel plants the pods are waxless, Just as in arg wp and arg wel plants.