

SUMMARY

1. The development of sun and shade leaves of Cornus florida and Viburnum prunifolium growing under contrasting light intensities was studied for differences in growth, thickness, and morphological structures. Temperature and light conditions in Mettler's Woods and in an open field, where the plants were found to occur, were compared in order to determine the effect of these environmental factors upon leaf differences.

2. Leaves of Viburnum emerged and unfolded earlier than those of Cornus in the spring. In both species larger leaf area, which was produced by earlier and larger increases in growth rate (especially at the time of most rapid leaf expansion), was attained by shade leaves.

3. Comparisons of leaf thickness were reversed; that is, sun leaves became considerably thicker than shade leaves. Sun and shade leaves increased in thickness in about the same proportions during the period of early growth increments. The greatest divergence between leaf thickness in the two leaf types occurred later than the corresponding differences in leaf area.

4. Cell elongation, especially that of the palisade

tissue, was found to be responsible for increases in blade thickness. There was no difference in the number of cell layers between sun and shade leaves, though it was greater in the mature rather than in the embryonic leaf.

5. Embryonic leaves of sun and shade plants were basically alike in cell structure. The palisade and lowest spongy mesophyll were distinctly different from other layers. Changes in vacuolation of the embryonic cells were most marked during the time of leaf emergence and unfolding. Chloroplasts were also recognizable at this time. The initiation and formation of cells characteristic of the mature leaf was decidedly earlier in shade leaves, as was the case for increase in bud length and leaf expansion.

6. The drastic reduction of light penetration during and after the canopy had closed in the woods was associated closely with the appearance of differences between sun and shade leaves in blade thickness. Since increased thickness in sun leaves was found to be primarily due to cell elongation, light intensity was probably directly influential in producing the increase in cell size. Cell division, on the other hand, was probably determined by factors other than light.

7. Temperature, which is on the average higher

and less extreme in the woods, may be one of the determining factors in producing earlier development in shade rather than sun leaves.