

DIFFERENTIAL DISTRIBUTION OF ASH ALONG THE AXIS OF HERBACEOUS PLANTS

A. E. KIKKOOPIE

Northwestern University, DeKalb, Illinois

To better understand the chemical composition of herbaceous plants it is often necessary to know the quantity and distribution of minerals along the axis of the plant. The work was undertaken in the hope that a fuller knowledge of this problem might be forthcoming.

One piece of literature was available in the writer. Tukey and Green, working on the rose plant, *Rosa rugiflora* (Thunb.), found that there was an increasing ash and water gradient on the basis of dry and wet weights when the ash and water estimates were made along the axis of the stem from base to tip.

Among the several plants sampled in this study were tobacco, cabbage, tomato, and Bryophyllum. The plants were grown for four months in the greenhouse under rather uniform conditions of light, temperature, humidity, and soil composition. At the end of the growth period the plants were uprooted and lengths of tissue, each one centimeter long, were taken from the base, the middle, and the apical regions of the stem.

The samples for ashing consisted of composite sets of stem tissue, each piece from a specific area of the stem under examination. The fresh or wet weight, the oven-dry weight, and the ash weight of the samples were obtained. These

weights were used in calculating the increasing or decreasing ash gradients along the axis from base to the tip of the stem.

The data of this investigation seem to show that in herbaceous plants there is an increasing ash gradient on the basis of dry weight and a decreasing ash gradient on the basis of wet weight along the axis from base to tip of the stem. There is also an increasing water gradient from base to tip of the stem when the estimate is made on the basis of wet weight.

In the main, these findings agree with those found by Tukey and Green for the rose plant. They record an increasing ash and water gradient along the stem from base to tip in all instances.

It appears then that the increasing ash content for herbaceous plants, from the base to the tip of the stem, is due in part to a greater accumulation of such materials as carbohydrates and fats at the base than at the tip of the stem, which materials contain less minerals, and in part, at least, to an increased accumulation of protoplasm toward the tip of the stem apparently accounting for the increase of ash content in that region.

* Plant Physiology, 1931.

TABLE I. THE PERCENTAGE ASH CONTENT (A) OF THE STEM, TO THE DRY WEIGHT (D. W.) AND TO THE WET WEIGHT (W. W.) AND THE PERCENTAGE OF WATER (W.)

Stem	Ash Content (A)			
	Base	Middle	Tip	
1. Tobacco (White Burley)	% A/D. W.	5.80	10.14	12.08
	% A/W. W.	7.17	1.97	7.80
	% W. W. W.	97.15	11.33	62.66
2. Cabbage (New Jersey)	% A/D. W.	4.83	5.42	7.24
	% A/W. W.	1.33	1.34	1.22
	% W. W. W.	86.72	71.62	83.43
3. Tomato (Rouge de France)	% A/D. W.	8.30	14.73	15.02
	% A/W. W.	1.26	1.11	1.09
	% W. W. W.	36.68	90.72	61.53
4. Bryophyllum pinnatum	% A/D. W.	11.67	18.15	19.55
	% A/W. W.	1.26	1.12	.97
	% W. W. W.	81.45	91.23	64.33