PHYSIOLOGICAL DISTURBANCES IN TOBACCO PLANTS ACCOMPANYING MOSAIC INFECTION

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Seeds of Burley tobacco plants were germinated in the greenhouse and the seedlings transplanted into two-inch pots as soon as they were large enough to handle. As growth proceeded, the plants were repotted successively into four and eight inch pots. When the plants had five well developed leaves, the lower two were removed, and the lowest remaining leaf was designated as number one and the higher leaves numbered consecutively. Several new leaves appeared during the course of the study and they were designated by consecutively higher numbers as soon as they were large enough to be included in the experimental material.

Leaf number one was inoculated with the mosaic virus by rubbing a small area with a piece of cheesecloth soaked with press juice of plants in an advanced stage of the disease.

At intervals of two or three days, the leaves of similar age from normal and inoculated plants were studied in the laboratory to observe changes in respiratory rate, and in the activities of peroxidase, oxygenase, catalase and invertase.

The purpose of making the above observations was to discover if there was a significant difference in the time required for the plant to show a physiological disturbance and that required to attain an infectious concentration of newly formed virus.

The rate of oxygen used by the leaves of mosaic infected plants was greatly increased by the fourth day after the lower leaf was inoculated. This period of stimulated metabolism preceded by approximately ten days the general appearance of the virus in infectious concentrations. The enzymes also showed a disturbed activity very soon after infection. These data show that the appearance of newly formed virus in infectious concentration occurs approximately ten days after the tobacco plant has undergone profound physiological changes. This

TABLE 1.—The Physiological Activities of Leaves From Mosaic Infected Tobacco Plants Expressed as Percentages of the Activities of Leaves of Similar Age From Normal Plants.

Leaf	Oxygen use				Oxygenase				Peroxidase			
	Maximum		Minimum		Maximum		Minimum		Maximum		Minimum	
	Value	Day	Value	Day	Value	Day	Value	Day	Value	Day	Value	Day
Leaf 1	137.0	4	83.7	18	200	14	49	6	143	11	74	4
Leaf 2	119.8	2	82.3	18	250	14	66	4	108	14	95	8
Leaf 3	111.3	4	94.9	6	165	6	81	4	100	14	94	4
Leaf 4					125	11	80	4	120	14	98	4
Leaf 5					200	14	72	8	100	16	87	14
Leaf 6	99.7	18	77.7	21	125	16	100	14	131	16	91	14

Leaf	Catalase				Invertase			
	Maximum		Minimum		Maximum		Minimum	
	Value	Day	Value	Day	Value	Day	Value	Day
Leaf 1	210	11	69	2	273	16	78	6
Leaf 2	315	8	92	2	143	18	72	8
Leaf 3	223	8	86	2	110	11	77	8
Leaf 4	169	18	67	8	106	11	85	6
Leaf 5	354	18	76	6	103	11	74	18
Leaf 6	146	18	47	8	117	11	65	16

indicates that it is not impossible for the virus substance to be a product of this abnormal metabolism. If the observed physiological changes were due to a direct effect of the virus itself, one would expect the disturbances to parallel or follow the appearance of the virus, but actual observations show that the amount of virus present at any time has no relation whatever to the magnitude of the disturbed metabolism of the plant.

A detailed discussion of the data will be published at a later date.