cases of bacterial wilt is, then, still *subjudice* with probabilities strongly in favor of its being due to Diabrotica 12-punctata; as an important means of mid-season spread of the disease flea beetles have been definitely indicated.

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PHYSIOLOGICAL STABILITY IN MAIZE*

THE significant results of Davidson and LeClerc[1] and of Gericke,[2] who obtained increased protein content of wheat grain by delaying the application of nitrates to the soil, raise pertinent questions regarding the possibility of similarly modifying other species and genera of plants. Particular interest attaches to maize in this respect, because of the leading position which it occupies among the crops treated with commercial fertilizers.

Woods[3] has shown that the percentage of protein in maize grain remains constant, despite large increases in yield of crop, with the addition of nitrate of soda to a carrier of potassium and phosphorus. With sand cultures of this plant, Duley and Miller[4] found a decreased percentage of nitrogen in the ears when the concentration of nutrient solution supplied was deficient during the development of this organ, but it should be noted that the supply of nitrogen was not varied independently in this case.

The writer has completed two tests in the greenhouse and one in the field with maize, following the procedure applied to wheat by LeClerc and by Gericke. In the field test the Golden Glow dent variety was grown on Miami silt loam lightly top dressed with farm manure. For the greenhouse test Leaming's Yellow Dent variety was grown on silt loam impoverished by dilution with an equal weight of sand. To this were added liberal supplies of all the essential elements of fertility. In applying the nitrate of soda either one third was added when the plants were about one foot high and the remainder well after the onset of ear filling or the reverse order was followed. In these tests the variations of nitrate supply did not modify the nitrogenous content of the cured seed, excepting in one of the greenhouse tests which was conducted during deficient illumination of the winter months. In this case the application of the greater part of the nitrate at the later stage of growth increased the protein content by 1.5 per cent.

Not only does maize withstand modification of composition through variation of nutrient treatment, but it is also peculiarly free from such modification through variation of climatic factors. The latter characteristic was early observed by Richardson,[5] who found inappreciable differences in the nitrogen content of maize seed reared in widely separated sections of the United States. In their comprehensive treatises on this plant species both Hunt[6] and Burt-Davy[7] quote data showing little influence of climate upon the protein content of the grain. Cooperatively with Professor E. J. Delwiche of the Department of Agronomy at this institution, the writer has found in three out of four years the same protein content of maize grain reared from common seed stock and under closely similar cultural conditions at Ashland and Madison. These Wisconsin stations represent a difference of 250 miles in latitude.

The behavior here emphasized shows marked contrast in comparison with the susceptibility of the sugar beet root and wheat grain to compositional modification through the influence of environmental factors, as shown by Wiley[8] and by LeClerc.[9]

TABLE I

COMPARATIVE NITROGENOUS COMPOSITION OF LEAVES

Date of Sampling	Species of Plant	Dry Matter in Fresh Leaf	Total Nitrogen in Dry Matter	Soluble Nitrogen in Total Nitrogen	Distribution in the Soluble Nitrogen			
					Protein	Mono Amino	Ammonia	Basic (a)
		%	%	%	%	%	%	%
8/14	maize	27.8	2.0	19	28	29	7	36
8/14	mangold	11.3	5.1	77	80	2	trace	18
8/26	maize	30.6	2.4	21	33	23	3	41
8/26	mangold	13.2	4.4	82	81	5	1	13

(a) Mixed forms, determined by difference.

* Presented in abstract at the annual meeting of the Wisconsin Academy of Sciences, Arts and Letters, Beloit, April 6, 1923. Published with permission of the Director of the Wis. Agric. Expt. Station.

1 Jour. Agric. Res 23: 55, 1923.

2 SCIENCE 52: 446, 1920.

3 Conn. (Storrs) Agric. Expt. Sta. Report, 1889, p. 127.

4 Mo. Agric. Expt. Sta. Res. Bul. 42, 1921.

5 U. S. Dept. Agric., Chem. Div. Bul. 4: 64, 1884.

6 "The Cereals in America," New York, 1910.

7 "Maize, Its History, Cultivation, Handling and Uses," London, 1914.

8 U. D. Dept. Agric., Bur. Chem. Bul. 96, 1905.

9 U. S. Dept. Agric., Bur. Chem. Bul. 128, 1910.

Doubtless differences in genetical constitution should receive consideration in seeking explanation of such difference in behavior, but apparently such consideration must include modifications of the physical and chemical mechanisms within the organism. Possibly the marked deficiency in bulk of tissue interposed between synthetic and storage centers (leaf and root) in the sugar beet as compared with the massive stalk of maize may exercise a controlling influence upon metabolic response, but it is evident that with the former plant species we are dealing with the composition of stem tissue, which may be expected to show greater variability of composition than the seed. In comparing the gross anatomical structure of wheat with that of maize it is noteworthy that, while possessing an even greater proportionate bulk of stem (in terms of dry matter), the former lacks the bulky cob structure of maize.

We are inclined, however, to attach special significance to differences in chemical mechanism within the plant. It would seem profitable, in this connection, to compare the composition of corresponding organs and especially of the leaves, in different plant species, with reference to diurnal and seasonal variations. The data of Table I were obtained by S. Lepkovsky and the writer from chemical analysis of leaf mesophyll tissue from dent maize and sugar mangold, sampled simultaneously from adjacent plantings in the field under identical environmental conditions. While the stage of growth within the complete life cycle of the two plant species was here quite different, the results may serve to suggest the type of differences in metabolic reactions which could be expected to accompany wide differences in physiological stability.

The data of Table I are typical of the relatively low planes of total and soluble nitrogen found in the maize leaf, as compared with that of the sugar mangold. In the former, in addition to a high proportion of insoluble nitrogen, the free amino acids are conspicuous among the less highly organized nitrogenous compounds. These features accompany a relative dryness of tissue in the maize leaf. It is at least noteworthy that plants differing so markedly as these two in physiological behavior should also differ widely in composition of an organ with preponderant synthetic functions. We venture to suggest that results of importance to the explanation of physiological stability in various plant forms may accrue from investigation along the course here outlined. Acknowledgments are due to Professors B. E. Livingston and E. J. Kraus for constructive criticisms incorporated herein.

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THE GEORGIA ACADEMY OF SCIENCE

THE Georgia Academy of Science held its second annual meeting on November 30 and December 1 at the Georgia School of Technology. On Friday afternoon, November 30, there was a short business meeting, at which the officers for next year were elected as follows: W. S. Nelms, Emory University, *president*; B. M. Hall, Atlanta, *vice-president*; Henry Fox, Mercer University, *secretary-treasurer*; J. R. Fain, State College of Agriculture; J. M. Reade, University of Georgia; L. L. Hendren, University of Georgia, and W. V. Skiles, Georgia School of Technology, *members of the eexcutive council.* After the business meeting the rest of the afternoon was given to the presentation of papers, the titles of which were as follows:

The behavior of beta-halogen phosphorus compounds toward alkaline reagents: E. L. JACKSON (introduced by J. S. Guy).

A report on and partial explanation of some long time fertilizer work on fruits: T. H. MCHATTON.

Some general statements concerning the geological development of Georgia: S. W. MCCALLIE.

A transition period in Georgia agriculture: A. M. SOULE (read by title).

Flood control in connection with water power development: B. M. HALL.

At 6.30 p. m. the meeting adjourned for the annual dinner, which was served in the dining-hall of the school of technology, following which the academy School of Technology, following which the academy President M. L. Brittain, of the School of Technology; an address by the retiring president of the academy, Dr. R. P. Stephens, and one by Dr. J. E. Paullin, of Atlanta, on "A bio-chemical consideration of insulin in the treatment of diabetes mellitus."

On Saturday, at 9.00 a. m., the meeting was again called to order and the following papers were presented:

Lightning and some of its effects: D. T. SAVANT (introduced by T. W. Fitzgerald).

Torques and forces between high frequency currents: W. A. PARLIN (introduced by W. S. Nelms).

Potash in Georgia soils: L. M. CARTER (read by title).

Is psychology science? G. C. WHITE.

Modifications in the Morecroft radio sending circuits: J. B. PEEBLES.

Adaptability of pasture plants to the climate and soils of coastal Georgia: J. R. FAIN (read by title).

Studies in the life history of Euglena: W. B. BAKER (introduced by R. C. Rhodes).

HENRY FOX,
Secretary