SUMMARY

An improved form of drop recorder is described which has an accuracy of 600 drops per cc.

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SPECIAL ARTICLES

A STUDY OF IODINE IN SOUTH CAROLINA[1]

SINCE the day Courtois made iodine from seaweed by heating it with sulphuric acid, and only a year or two later Gay-Lussac identified it as an element and gave it the name "iodine," much has been written in regard to its sources, properties and uses.

Research work in recent years indicates that the amount of iodine found in water, soil and plants from different sources varies to a considerable extent. In some sections of the United States, where there is a deficiency of iodine in the water and food, goiter is quite common, and certain troubles such as hairless pigs and big head in calves and sheep are quite prevalent. The presence or absence of iodine in a region has therefore a very important bearing on the health and happiness of the people.

Something over two years ago a project was begun by the chemistry division of the station with the idea of studying the relationship of the mineral content of feeding stuffs grown in South Carolina and the mineral content of the soils upon which they were grown. Iodine is one of several elements involved in this study.

Where the plant obtains its iodine and why plants from some sections of the country carry more iodine than others are points of considerable interest. From the analysis of many soils and waters from different parts of South Carolina it would seem that there is sufficient iodine present for the plants. The original source of this iodine is a matter for some discussion. It is likely that most of it comes from the rocks from which the soils are formed, especially in the Piedmont section.

However, there are other possible sources. It is quite possible that some is being carried through the air from the ocean along with micro-organisms and dust particles, while the coal smoke washed down by rain is another source. Rain-water at Clemson College carries some iodine. Another source is that of nitrate of soda. Caliche, the mineral from which nitrate of soda is obtained, is the greatest commercial source of iodine to-day. Several samples of nitrate of soda used in this state during the year 1928 analyzed from .027 to .054 per cent. of iodine.

[1] Contribution from the Chemistry Division of the S. C. Experiment Station.

During the years 1923 through 1927 there was sold in South Carolina annually an average of ninety-three thousand (93,000) tons of nitrate of soda. And this state had been using this fertilizer for many years previous to this.

This would mean the addition of approximately ninety-three thousand (93,000) pounds of iodine annually to the soils of this state. The iodine in sodium nitrate is largely in the form of sodium iodate.

SOILS

In the analysis of soils less iodine is found in the first six inches, and it increases with each succeeding six inches through a depth of eighteen inches. This may be due to several causes. It has been shown that there is an evaporation of iodine from the soil. The growing plant removes a portion, while leaching by water carries some in the opposite direction.

Less iodine is found in the soils from the middle section of the state than those from the upper portion. This may be due to a difference in the soil formation, the soils from the Piedmont region being formed from granites, quartzites, gneisses, etc., which usually show considerable iodine.

There is very little data for comparison on the iodine content of soils in this section of the country. The results as found in this state are shown in the table below:

Location	No. of samples	IODINE—PARTS PER BILLION			
		0–6 inches	6–12 inches	12–18 inches	Total
State Park	36	142	246	377	765
Clemson College	15	188	419	627	1,234
Florence	45	304	508	638	1,650
Bishopville	18	185	707	1,023	1,915
Trenton	18	344	888	1,181	2,413
Gaffney	9	684	1,161	1,176	3,021

IODINE IN FEEDING STUFFS

Although there is a lack of uniformity in the iodine content of plants of the same variety, yet there is no doubt that some plants have a greater preference for it than others.

From the results of this investigation it seems that vetch, winter field pea and soy-beans run somewhat higher in iodine than the other feeds, while among the vegetables, spinach, lettuce, mustard and turnip tops are the best iodine carriers.

There are other feeds that are possible sources of iodine. A sample of fish meal and one of tankage received recently by this laboratory analyzed 1,350 and 1,000 parts per billion of iodine respectively.

The results for vegetables and feeding stuffs are given in the table below:

IODINE IN PLANTS

Feedstuffs	No. of samples	P.P.B. iodine av.
Soy-beans	48	224
Cow-peas	8	162
Oats and vetch	2	560
Vetch	6	418
Oats	44	219
Grass hay	28	150
Alfalfa	3	170
Lespedeza	1	150
Winter field pea	2	880
Clover	5	380
Johnson grass	1	350
Rye and vetch	3	429
Bermuda grass	1	100
Paspalum	1	150
Vegetables*		
Turnip, Extra Early Milan		19
Turnip roots, Early Milan		28
Lettuce		224
Lettuce		340
Lettuce, from greenhouse		54.3
Mustard		83.5
Mustard		391
Spinach		464
Spinach		100
Potato, sweet		108
Rice		44.8
Radish roots		14
Asparagus		6.7
English peas, shelled		6.04
English peas, hulls and vines		15.2
Cabbage		7.4
Cabbage		11.26
Turnip tops		66.5
Collards		94.0
Turnip, white		29.0
Turnip, rutabaga		96.0
Broccoli		68.4

* The results for the vegetables are calculated on the green sample.

IODINE IN WATER

Eight river waters in the state were analyzed, and they varied in iodine content from two to six parts per billion. The largest amount was found in the Enoree and Broad Rivers. These samples were taken in the upper part of the state.

The drinking waters, both raw and pure, from four of the largest cities in the state were analyzed. The results of the pure waters varied from 1.5 parts per billion to 3 parts per billion, while the raw waters ran from 4 to 5 parts per billion.

This loss occurs quite likely in the process of filtration whereby living organisms and organic matter which contain iodine are removed.

Two deep wells at Clemson gave from 1 to 4 parts per billion of iodine, while two spring waters varied from .5 to 2 parts per billion.

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A NEW DISEASE OF DOUGLAS FIR

DURING the fall of 1927 the writer, while engaged in scouting for larch canker, discovered a peculiarly abnormal condition of the Douglas fir, *Pseudotsuga taxifolia* (Lam.) Britt., located on a large private estate at Potowomut Neck, Warwick, Rhode Island. A considerable portion of this land originally was a sand barren, yet extensive plantings of white pine, red pine, Scotch pine, European larch and Douglas fir, together with many broad-leaf genera, have been made thereon and thousands of these trees are now in a fairly flourishing condition. This estate has been cited as one of the first as well as one of the most conspicuous examples of successful private reforestation in the east. It was donated recently to the State of Rhode Island as the Goddard Memorial Park and now constitutes a valuable part of the Metropolitan Park System.

It should be stated at the outset that Douglas fir is not indigenous to the east, although for many years it has been grown here with success as an ornamental. Its habitat is the forests of the Pacific Slope and the Rocky Mountains. In those regions it grows to enormous dimensions and constitutes one of our most valuable timber trees. Three main varieties are recognized and are known respectively as the Pacific Slope, the Northern Rocky Mountain and the Central and Southern Rocky Mountain forms.[1] The Douglas fir in the Goddard Memorial Park is apparently of the last variety. Records seem to indicate that it was grown from seed collected in Colorado. The statement has been made that the original shipment of Douglas firs to this estate

[1] George B. Sudworth. "Check List of the Forest Trees of the United States. Their Names and Ranges." U. S. D. A. Misc. circular 92, p. 28, 1927. There has long been belief among European botanists that our Douglas fir represents at least two distinct species, one ranging through the Pacific Slope region and eastward into the northern Rocky Mountain region, the other being found roughly in the central and southern Rockies. Augustine Henry and Margaret G. Flood (in Proc. Royal Irish Acad., vol. 35, sect. B; 62–99, pl. 12–14, 1920) propose to designate the Pacific Slope form as "Pseudotsuga Douglasii Carriere," and the northern Rocky Mountain form as "P. Douglasii var. caesia Schwerin"; while for the central and southern Rocky Mountains form they propose the name "P. glauca Mayr."