nodosum. The hyphalike cells of *P. lanosa* penetrated well into the medulla of *A. nodosum*, thereby disturbing the latter's general histological pattern and producing a necrotic appearance. In living sections the red cells of *P. lanosa* produced a good natural contrast with the greenish-brown cells of *A. nodosum*. As *P. lanosa* pushed its way in, many cells of the host appeared to have become crushed or dissolved. Although cells of *P. lanosa* did not appear to be intracellular in relationship to the host, it is believed that there could be an exchange of elaborated foods similar to that reported in *Cuscuta* sp. (*9*). Further reports will be made on this problem as soon as more data are obtained.

References

1. CHAPMAN, V. J. *J. Linnaean Soc. London, Botany*, 1937, **51**, 205.
2. FRITSCH, F. E. *The structure and reproduction of the algae*. New York: Macmillan, 1948. Vol. II.
3. KNIGHT, M. *Trans. Roy. Soc. Edinburgh*, 1923, **53**, (2), 343.
4. *Ibid.*, 1929, **56**, (2), 307.
5. KYLIN, H. *Botan. Notiser*, 1927, 275.
6. ———. *Botan. Rev.*, 1935, **1**, (4), 138.
7. PAPENFUSS, G. F. *Science*, 1933, **77**, 39.
8. ———. *Botan. Notiser*, 1934, 437.
9. THODAY, M. G. *Ann. Botany*, 1911, 655.

The Control of Storage Sprouting in Onions by Preharvest Foliage Sprays of Maleic Hydrazide[1]

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Chemicals such as the methyl ester of α-naphthaleneacetic acid (*1*) and 2,4,5-trichlorophenoxyacetic acid (*2*), which have markedly retarded the growth of sprouts in stored potatoes and, under some conditions, in vegetable root crops, have had no apparent inhibiting effect upon sprouting of onions. A possible explanation may be that the growing points in the onion are so firmly enclosed and protected by layers of leaf bases that the chemicals fail to penetrate to the meristems. It is well known from numerous herbicide tests that substituted phenoxy acids, in general, have little effect on monocotyledonous plants. In studies concerned with means of prolonging the storage life of onions, various growth substances were applied as preharvest foliage sprays. It was hoped that the intact growing plant might translocate the chemical or stimulus to the meristematic regions, making possible a penetration of the growth substance thus far not realized by postharvest treatments. There would be a possible added advantage in that the food product is treated only indirectly. Standard field spray equipment could also be utilized, thus eliminating many of the present difficulties incurred with treating produce after harvest.

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TABLE 1

EFFECT OF PREHARVEST FOLIAGE SPRAYS OF GROWTH REGULATORS ON SUBSEQUENT SPROUTING AND BREAKDOWN OF YELLOW SWEET SPANISH ONIONS IN STORAGE

Treatments	Concentration (ppm)	Weight of sprouts (g/40 bulbs)	Percentage of storage loss from	
			Sprouting	Breakdown
Sodium salt of α-naphthalene acetic acid	1,000	64.7	23	38
	5,000	36.8	22	40
2,4,5-trichlorophenoxyacetic acid	10	67.4	23	35
	50	68.1	28	46
Sodium salt of β-naphthoxyacetic acid	500	22.2	19	48
	2,500	45.3	14	49
Benzo-thiazol-2-oxyacetic acid	500	40.4	20	48
	2,500	53.6	30	44
Maleic hydrazide*	100	31.7	26	40
	500	3.9	10	21
	2,500	0.0	0	15
"Barsprout"—controls		28.8	26	69
No treatment—controls		40.5	19	26
Differences necessary for significance between treatments	5% Level	24.4	13	23
	1% "	34.3	18	33

* Formulated as the water soluble diethanolamine salt of 1,2 dihydro 3,6 pyridazinedione, and supplied by the U. S. Rubber Company, Naugatuck Division, Naugatuck, Conn. Concentrations are expressed as ppm of active ingredient.

Yellow sweet Spanish onions were started from greenhouse-grown plants, seeded March 1, and transplanted into a field of productive mineral soil the second week in May. On August 15, when the tops were still green and approximately one-third of them were down, water solutions of various growth substances (Table 1) were sprayed on the foliage of four 20-ft row replicates. Triton B-1956 at a concentration of 0.1% was used as a wetting agent. The chemical solutions were applied at the rate of 75 gal per acre by means of 3-gal hand sprayers. One week following treatment the remainder of the tops were turned down. The onions were harvested August 29. After the bulbs were cured for 2 weeks at a temperature of 85° F and a relative humidity of 50 ± 7%, they were placed in replicated lots of 20 bulbs in kraft paper bags and removed to a cold storage room (35° F) for 30 days, following which they were held at a temperature of 55° ± 3° F and a relative humidity ranging from 65 to 85%. Two control comparisons were used (Table 1): nontreated lots, and a postharvest application in commercial dust form of the methyl ester of α-naphthaleneacetic acid equivalent to 0.9 g active ingredient per bu.[2]

Observations were made March 2 after the onions had been held in storage for 5 months. No sprouting was evident on bulbs that had been harvested from plants the tops of which had been sprayed with 2,500 ppm of maleic hydrazide (1,2 dihydro 3,6 pyridazinedione), and there was a significant reduction in sprouting with 500 ppm. Some decrease in loss from storage breakdown

[2] Formulated as "Barsprout" by the American Cyanamid Company, New York City.

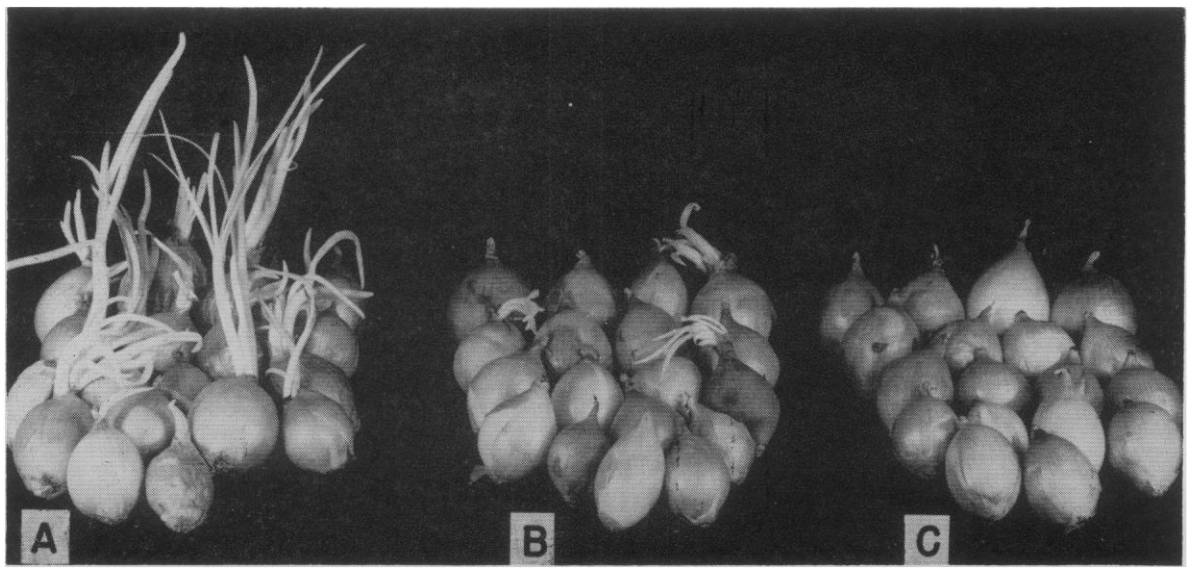

FIG. 1. The effects of preharvest foliage sprays of maleic hydrazide on sprouting of sweet Spanish onions. A, controls (nontreated); B, maleic hydrazide, 500 ppm; C, maleic hydrazide, 2,500 ppm.

(Table 1) was also observed. Gross longitudinal sections of bulbs resulting from treatment with 2,500 ppm of maleic hydrazide revealed an internal structure that was normal and indistinguishable from nonsprouting controls (not treated). Flavor, color, and odor were apparently not affected. Some of the bulbs from plants that had received the 500 and 2,500 ppm of maleic hydrazide were held for an additional 6 weeks in storage at 55° F and photographed April 15 (Fig. 1). Similar lots of bulbs resulting from treatment with 2,500 ppm of maleic hydrazide and planted March 5 in the greenhouse remained sound but completely dormant for 8 weeks, whereas nontreated bulbs grew normally, producing profuse roots and large vegetative tops. Other chemicals caused no inhibition of sprouting. The sodium salt of α-naphthaleneacetic acid and 2,4,5-trichlorophenoxyacetic acid resulted in a significantly greater weight of sprouts, and the "Barsprout" formulation increased significantly the percentage of storage loss from breakdown (Table 1).

Some of the inhibiting effects of maleic hydrazide on plant growth have recently been described by Schoene and Hoffman (*3*), and subsequent reports (*4, 5, 6, 7, 8*) suggest that it has unique properties as a regulator of plant development. Results similar to those described herein for onions have been obtained with carrots, and studies are being conducted with other commonly stored root crops, sugar beets, and potatoes.

References

1. DENNY, F. E. *Contrib. Boyce Thompson Inst.*, **12**, 387 (1942).
2. ELLISON, J. H., and SMITH, O. *Proc. Am. Soc. Hort. Sci.*, **54**, 447 (1949).
3. SCHOENE, D. L., and HOFFMAN, O. L. *Science*, **109**, 588 (1949).
4. FILLMORE, R. H. *Arnoldia*, **10**, 33 (1950).
5. MOORE, R. H. *Science*, **112**, 52 (1950).
6. NAYLOR, A. W., and DAVIS, E. A. *Proc. Am. Soc. Plant Physiol.* (24th meeting) Abst., 13 (1949).
7. NAYLOR, A. W. *Proc. Nat. Acad. Sci. U. S.*, **36**, 230 (1950),
8. WHITE, D. G. *Science*, **111**, 303 (1950).

Loss of Choline Esterase Activity in Nerve Tissue Resulting from Processes of Histological Preparation[1]

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In the course of research involving studies of choline esterase activity in dog tissues, it became of interest to determine quantitatively how much of the enzyme activity present in fresh tissues remains in the paraffin-embedded tissues as employed in the histochemical technique (*1*).

For this purpose the entire cord and medulla of an adult dog were divided linearly into 48 approximately equal segments, weighed to the nearest 0.1 mg. Successive segments were then treated as follows: (*a*) the first segment was used to demonstrate the total enzyme activity present; (*b*) the second, maintained at refrigerated temperatures, was fixed in 95% alcohol for 6 hr, dehydrated in absolute alcohol for 12 hr, placed in a mixture of 1 part absolute alcohol and 1 part benzene for 30 min; (*c*) the third segment was treated as in (*b*) but in addition was immersed in melted paraffin at 52° C for 2 hr and deparaffinized in xylene for 1 hr; (*d*) the fourth segment was embedded, sectioned, and prepared by histochemical methods (*1*).

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