The biological activities of the various derivatives of biotin and the simpler analogues are tabulated in Table 1. The growth-promoting activities are expressed as per cent. activity of biotin. If the compound has antibiotin activity its molar inhibition ratio is given.

TABLE 1

THE GROWTH-PROMOTING AND ANTIBIOTIN ACTIVITIES OF COMPOUNDS STRUCTURALLY RELATED TO BIOTIN AND THEIR INTERACTION WITH AVIDIN

Compound	*Growth-promoting activity*		*Antibiotin activity**		Combination with avidin
	Yeast	*L. casei*	Yeast	*L. casei*	
	per cent.	*per cent.*			
Biotin	100	100	none	none	Yes
Biotin sulfone	0.1	0	none	280	Yes
Desthiobiotin	100	0	none	9,100	Yes
Biotin diaminocarboxylic acid	10	< 0.01	none	none	No
Desthiobiotin diaminocarboxylic acid	10	0	none	none	No
Imidazolidone valeric acid	0.0017	0	none	none	Yes
Imidazolidone caproic acid	0	0	760,000	126,000	Yes

* Antibiotin activity is expressed as the molar inhibition ratio.[6]

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GERMINATION OF LETTUCE SEED AT HIGH TEMPERATURE STIMULATED BY THIOUREA

THOMPSON and Kosar[1] have shown that the germination of dormant lettuce seed can be stimulated by treating the seed with a dilute solution of thiourea. Investigations by the senior author demonstrate further that thiourea-treated lettuce seed can be germinated at a much higher temperature than untreated seed.

Ten different strains of lettuce seed were selected for these studies. A portion of each of the 10 lots of seed was soaked in a 0.5 per cent. solution of thiourea in Petri dishes in darkness in a constant temperature chamber at 18° C. for 7 hours. After soaking, the seed was washed in tap water to remove the thiourea solution from the surface of the seed. The treated seed was then spread out thinly on absorbent paper in diffused light and thoroughly dried. After drying the seed was placed in brown paper envelopes and stored at room temperature for 10 days when each lot was tested for germination on wet filter paper in Petri dishes in a germinator at 33°–35° C. Treated and untreated samples of each of the 10 strains were tested for germination in quintuplicate lots of 25 seed each with the results presented in Table 1.

[1] Ross C. Thompson and Wm. F. Kosar, *Plant Physiol.*, 14: 567–573, 1939.

TABLE 1

SUMMARY OF DATA ON THE INFLUENCE OF THIOUREA ON THE GERMINATION OF 10 STRAINS OF LETTUCE SEED AT HIGH TEMPERATURE, 33°–35° C. FOR 5 DAYS

Strain numbers	Thiourea-treated seed						Untreated seed					
	replications						replications					
	1	2	3	4	5	Total	1	2	3	4	5	Total
1541–1	22	21	19	24	21	107	0	0	0	0	0	0
1562–4	23	23	23	22	24	115	0	0	0	0	0	0
1562–8	23	22	25	24	24	118	0	0	0	0	0	0
1568–2	25	25	25	24	25	124	0	0	0	0	0	0
1592–12	24	24	25	25	24	122	0	0	0	0	0	0
1620–7	15	20	18	18	20	91	0	0	0	0	1	1
1624–4	25	25	25	25	25	125	0	6	0	1	1	8
1624–9	25	25	25	24	24	123	0	0	0	1	0	1
1640–4	16	23	17	21	20	97	0	0	1	0	0	1
1664–1	15	11	16	16	10	68	0	0	0	0	0	0
Total						1090						11
Per cent. germinated						87.2						0.88

The germination temperature used (33°–35° C.) is much too high for the ordinary germination of lettuce seed as is shown by the 0.88 per cent. average for all 50 lots of untreated seed. However, the 50 lots of thiourea treated seed gave an average germination of 87.2 per cent. The strains of seed responded differently to the treatment. Four of the 10 lots, numbered 1568–2, 1592–12, 1624–4 and 1624–9, gave almost 100 per cent. germination when treated as described.

Three strains, numbers 1620–7, 1640–4 and 1664–1, gave the poorest response to the treatment with 72.8, 77.6 and 54.4 per cent. germination, respectively. All but a few weak embryos appeared to be normal.

Numerous other variations of the treatment, including temperature, length of time of treatment and exposure to light while soaking, have been studied. The procedure outlined above has been found to be near the optimum for the strains so far tested.

Many lots of lettuce seed treated as described have been planted in soil; germination was rapid and normal plants resulted. Although none of the tests in soil have been carried out at the extremely high temperature of 33°–35° C., the maximum temperature frequently reached 30° during the warmest part of the day.

There is reason to believe that the thiourea treatment may have a practical application for assuring satisfactory germination where it is necessary to plant when the soil temperature is too high for germination of most commercial lettuce seed.

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