In 1938 Maisin and Pourboix[6] had shown that by feeding of yeast they could reduce the percentage of tumors produced by carcinogenic substances.

Since then two papers[7, 8] have been published from this laboratory demonstrating the complete disappearance of spontaneous mammary carcinomas in 30 per cent. of the treated mice following intravenous injections of a watery yeast extract.

In a set of experiments which are the basis of this brief report we tried to influence the takes of a transplanted Carcinoma 2163 in the R III strain. This tumor is a mammary adenocarcinoma which in this laboratory was found to be transplantable in 95 to 100 per cent. of animals of this strain, the strain in which it arose. In our experience this carcinoma has proved very resistant to treatment.

TABLE I

PREVENTION OF TUMOR GROWTH. INBRED FRENCH STRAIN R III. TRANSPLANTED CARCINOMA 2163*

	No. of animals	Non-takes	Takes
Yeast and pantothenic acid	40	19 (47.5 per cent.)	21
Yeast	30	6 (20 per cent.)	24
Pantothenic acid	40	1 (2.5 per cent.)	39
Controls	40	2 (5 per cent.)	38

* In the first two experiments (20 animals) the intravenous treatment was started on the day of the transplantation and continued for 10 consecutive days. Since then in these prevention-experiments the intravenous treatment was given on 10 consecutive days and stopped on the day of transplantation.

The yeast extract for the prevention experiments was prepared as described originally[7] and was given intravenously in doses of 0.1 ccm (containing 4 mg of dry matter). 0.5 ccm pantothenic acid (calcium panthothenate dextrorotary) of a 50 mgm per cent. solution was administered intravenously. 0.5 ccm thiamin of a 50 mgm per cent. solution was used for intravenous application. We obtained these substances through the courtesy of Messrs. Merck and Company.

TABLE 2

PREVENTION OF TUMOR GROWTH. INBRED FRENCH STRAIN R III. TRANSPLANTED CARCINOMA 2163*

	No. of animals	Non-takes	Takes
Yeast + Riboflavin	29	18 (62 per cent.)	11
Yeast	28	6 (4 per cent.)	22
Riboflavin	29	4 (14 per cent.)	25
Yeast + Thiamin	28	5 (20 per cent.)	23
Thiamin	29	1 (4 per cent.)	28
Controls	29	.....	29

* [illegible] for 10 consecutive days be- [illegible] were stopped on the day of [illegible]

The accompanying charts demonstrate the effects of yeast, different vitamins and combinations of these substances on the prevention of tumor-growth. It is evident that the vitamins (pantothenic acid, riboflavin and thiamin) alone have none or very little effect on tumor growth. Yeast alone prevents tumor growth in about 20 per cent. only. This tumor-preventing effect of yeast was markedly improved by adding pantothenic acid (non-takes 47 per cent.) or riboflavin (non-takes 62 per cent.) to the yeast extract. Addition of thiamin to the yeast extract did not improve the tumor-preventing action.

R. LEWISOHN
C. LEUCHTENBERGER
R. LEUCHTENBERGER
D. LASZLO
K. BLOCH

MOUNT SINAI HOSPITAL,
NEW YORK

EFFECTS OF VITAMIN B_1 ON WOODY EROSION-CONTROL PLANTS[1]

RECENTLY there has been considerable interest in the use of vitamin B_1 for stimulating plant growth. The results reported here are concerned with the relation of added vitamin B_1 (thiamin chloride) to the survival and growth rate of young woody erosion-control plants in the field. By a woody erosion-control plant is meant one that possesses to a high degree the ability to withstand indifferent handling, drought, adverse soil conditions and vigorous competition. For deciduous erosion-control plants, these requirements are best realized by planting seedlings with strong taproots that are large in proportion to the size of the tops and that contain much stored food.

Plantings were made at two locations: (1) On recent sandy alluvial soil in an intermontane valley in the Santa Rosa Mountains, in Riverside County, California. The Santa Rosa planting is in a mountainous mediterranean climate. (2) On primary heavy grassland soil near Capistrano, Orange County, California. The Capistrano planting is in a coastal mediterranean climate, with moderately cool summers. Precipitation during the experimental period was at or above normal.

Seedlings were planted in natural soil in holes dug by shovels to a depth just sufficient to accommodate roots without bending. Soil was filled back into holes and tamped by shovel and by hand. Around each plant a ring of soil was thrown up to form a basin; subsequent waterings were made in these basins from tank wagons. At Capistrano domestic tap water was used; at Santa Rosa water from a surface reservoir was used. Where vitamin B_1 was used in the experi-

[6] J. Maisin and Y. Pourboix, *Comptes rend, Soc. biol.*, 127: 1477, 1938.

[7] R. Lewisohn, C. Leuchtenberger, R. Leuchtenberger and D. Laszlo, *Proc. Soc. Exp. Biol. and Med.*, 43: 558–561, 1940.

[8] R. Lewisohn, C. Leuchtenberger, R. Leuchtenberger and D. Laszlo, *Am. Jour. Path.*, 17: 251–260, 1941.

[1] Field and clerical assistance was furnished by the Works Projects Administration.

TABLE 1

PERCENTAGE SURVIVAL OF CONTROL PLANTS AND VITAMIN B_1 TREATED PLANTS AT THE SANTA ROSA SITE IN RIVERSIDE COUNTY, CALIFORNIA

Species	Number of plants		Amount of vitamin B_1 solution* applied (total per treated plant)	Percentage survival of plants on different dates							
				June, 1939		Oct., 1939		June, 1940		Dec., 1940	
	Control	Treated		Control	Treated	Control	Treated	Control	Treated	Control	Treated
			liters								
Chilopsis linearis ..	12	13	44	100	100	83	75	83	75	83	58
Fraxinus velutina ..	64	66	40	91	85	74	69	70	59	37	23
Gleditsia triacanthos	58	60	40	88	73	67	61	61	57	25	32
Juglans hindsii ...	7	7	44	100	100	100	100	100	100	86	86
Prosopis juliflora ..	41	39	44	95	92	74	64	55	39	42	29

* The solution had a concentration of .05 mg crystalline vitamin B_1 per liter.

ment, it was added at the rate of .05 mg per liter of water.

Species listed in Table 1 were planted April 6 to 15, 1939. All these plants received water at planting time and two weeks later. On these two occasions no vitamin was added. On May 17, 1939, vitamin solution was applied to basins of plants listed in Table 1 as treated plants. On the same date coordinate applications of water were made to control plants. Applications similar to those given May 17, 1939, were repeated June 8, July 10 and August 8, 1939. No further applications were given after August 8, 1939. The total amount of the vitamin solution added to the basin of each of the plants receiving the vitamin is shown in Table 1.

For the Santa Rosa site, Table 1 shows the survival of control plants and of treated plants during 1939 and 1940. The differences between the new shoot growth of the treated plants and of the control plants were not significant at any time during the test at Santa Rosa.

The species listed in Table 2 were planted April 10 to 20, 1939. The plants grown at this Capistrano site differ in their treatment from those of the Santa Rosa site. At the Capistrano site vitamin solution was applied immediately after planting to the basins of treated plants. Control plants at planting time received coordinate applications of water to which no vitamin was added. Applications of water (no vitamin added) to control plants and of vitamin solution to treated plants were given on May 1, May 24, June 20, July 20 and August 14, 1939. No further applications were given after August 14, 1939. Total amount of the vitamin solution added to the basin of each of the plants receiving the vitamin is shown in Table 2.

Table 2 shows the percentage survival of control plants and of treated plants in the test at Capistrano. No significant differences were found in the new growth of the treated plants and of the control plants at the Capistrano site.

Conclusions: For the plants tested, no marked beneficial effects were found in the initial survival or initial growth rate by adding vitamin B_1 in water (in concentration of .05 mg per liter of water) to the soil surrounding the plants. The data on survival suggest that added vitamin B_1 may have had, under the conditions of the experiment, an adverse effect on the survival of some of the species tested.

TABLE 2

PERCENTAGE SURVIVAL OF CONTROL PLANTS AND VITAMIN B_1 TREATED PLANTS AT THE SAN JUAN CAPISTRANO SITE IN ORANGE COUNTY, CALIFORNIA

Species	Number of plants		Amount of Vitamin B_1 solution* applied (total per treated plant)	Percentage survival of plants on different dates							
				July, 1939		Feb., 1940		July, 1940		Jan., 1941	
	Control	Treated		Control	Treated	Control	Treated	Control	Treated	Control	Treated
			liters								
Acacia farnesiana	18	18	48	100	100	100	100	100	100	100	100
Chilopsis linearis	27	27	96	100	100	96	96	96	93	93	89
Juglans hindsii	26	26	96	100	100	100	100	100	100	100	100
Juglans hindsii × J. regia	10	10	96	100	80	100	80	100	80	100	80
Olea verrucosa	9	9	96	100	100	100	100	100	100	100	100
Prosopis juliflora	27	27	96	100	100	93	100	93	100	93	100
Simmondsia californica .	27	27	48	100	100	89	81	89	70	89	70

* The solution had a concentration of .05 mg crystalline vitamin B_1 per liter.

MAURICE DONNELLY
UNIVERSITY OF CALIFORNIA CITRUS EXPERIMENT STATION AND U. S. SOIL CONSERVATION SERVICE, RIVERSIDE