has less total and hydrocarbon carotenoids, lycopene, phytoene, β-carotene, and γ-carotene than 'New Yorker'.

Tomatoes are an important source of Vitamin A in the diet. Although several other fruits and vegetables contain a higher β-carotene content, the average consumption of tomatoes is so large that they represent a significant contribution to the Vitamin A in the diet. Senti and Rizek (6) calculated that tomatoes are second only to carrots as a source of Vitamin A, and contribute 9.5% of the available Vitamin A.

Considering a biopotency value (14) for β-carotene of 100% and γ-carotene of 43%, and that only one-sixth of the β-carotene from a diet is actually converted to retinol in humans and that 0.3 μg retinol is by definition equivalent to 1 International Unit of Vitamin A (3), 'New Yorker' contained 28.9 IU/g and 'Crimson New Yorker' contained 11.4 IU/g on dry weight basis, a 60% reduction.

The U. S. Food and Drug Administration (1) requires that new cultivars to be used for food should be tested for nutritive composition if there is reason to believe that nutritive content is reduced by 20% or more. The effect of the og^c gene on provitamin A clearly requires that new cultivars with this gene be tested to determine their nutritional value. In replicated yield trials, 'Crimson New Yorker' has proven to be superior in fruit color and equal to 'New Yorker' in earliness, yield, and all other important horticultural traits. The original intent of breeding this line was to develop a cultivar similar to 'New Yorker' except for having better fruit color, but the provitamin A content is reduced to such an extent in this gene background that 'Crimson New Yorker' is not being released as a cultivar.

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Influence of Preharvest Temperature and Flooding on Sweet Potato Roots in Storage[1]

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Additional index words. Ipomoea batatas, respiration, sprouting, storage rots

Abstract. **Plants of sweet potato (*Ipomoea batatas* (L.) Lam) were exposed prior to harvest to 1 week of warm-dry, warm-flooded, cold-dry or cold-flooded soil conditions. Roots harvested from the warm-flooded soil showed more rotting during curing than roots from the other treatments, and rotting continued during storage. Roots harvested from the cold-flooded soil rotted to a lesser extent during curing but rotted rapidly during storage. Roots harvested from the cold-dry soil showed no rotting during curing; however after 52 days of storage, the number of roots with rot increased sharply. Root respiration rates from cold-flooded, cold-dry, and warm-flooded soils were not significantly different, but those rates were much higher than the rate in roots from warm-dry soil. 'Jewel' had a lower respiration rate than NC 317. The cold treatments stimulated sprouting of sweet potato roots during storage. 'Caromex' showed the highest sprouting followed by 'Jewel', NC 317, and 'Centennial'.**

Preharvest soil conditions can influence postharvest quality and storability of sweet potatoes. Harvesting roots from flooded and/or cold soils adversely affected keeping quality (2) and increased storage rots (1, 3). Both soil conditions result in abnormal respiratory responses in the roots (3, 4). It has been postulated that combined low temperatures and high soil moisture prior to harvest influence respiration rates and keeping quality and enhance storage rots (1), but there is no indication of which preharvest soil condition is more important in causing storage rots.

This study was conducted to determine whether poor quality during storage was caused by flooded and/or cold soil conditions shortly before harvest and to determine which soil condition had a more adverse effect.

Four sweet potato genotypes ('Jewel', 'Centennial', 'Caromex', and NC 317) were grown outside in 30 cm diameter × 20 cm high plastic containers in a sterilized 1 peat:2 soil:1 sand mix with 4 g of 6N–5.2P–5.0K fertilizer added per pot. They were fertilized during the growing season with an additional 0.98 g N, 0.89 g P_2O_5, and 1.71 g K per pot and watered daily. Four weeks before harvest, trailing vines were trimmed for ease in moving the pots.

Containers were randomly divided into 2 groups and moved to a cold room (4°C) or warm room (24 to 34°C). Each large group was subdivided into 4 groups of 16 pots (analyzed as replications) and exposed to flooded or dry (control) soil conditions. All plants were given a 14 hr photoperiod using lights during the week of treatment. Flooded conditions consisted of saturating the soil with warm (24 to 34°C) or cold (4°C) water for the entire treatment period of 1 week. The dry plants were watered prior to being placed into the treatment rooms and then received no additional water during the week prior to harvest. The experimental design was therefore a split plot with 4 genotypes, 4 treatments (warm-dry, warm-flooded, cold-

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[3]Assistant Professor.

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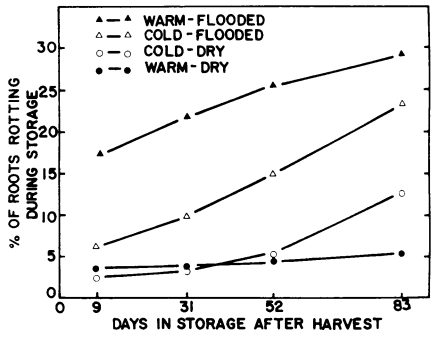

Fig. 1. Cumulative percentage of sweet potatoes which exhibited storage rots after one week of exposure to warm-dry, warm-flooded, cold-dry, or cold-flooded soil conditions before harvest (data represent the average response of all 4 genotypes). LSD 5% for testing differences between treatments within the same day or within different days in storage is 6.4. LSD 5% for testing differences between days in storage within the same treatment is 3.7.

Table 1. Percentage of sweetpotato roots which sprouted in storage after exposure to warm-dry, warm-flooded, cold-dry, or cold-flooded soil conditions before harvest.

Genotype	Treatment: Warm dry	Warm flooded	Cold dry	Cold flooded	Genotype means
Jewel	3.3	1.6	29.3	22.9	14.3
Centennial	0.0	0.0	2.9	7.7	2.7
NC 317	0.0	0.0	9.3	4.9	3.5
Caromex	28.4	19.4	68.1	57.8	43.4
Treatment means	7.9	5.2	27.4	23.3	

LSD 5% for testing differences between genotypes is 9.2. LSD 5% for testing differences between treatments is 7.1. LSD 5% for testing differences between treatments within the same genotype is 14.2. LSD 5% for testing differences between genotypes within the same treatment is 15.3.

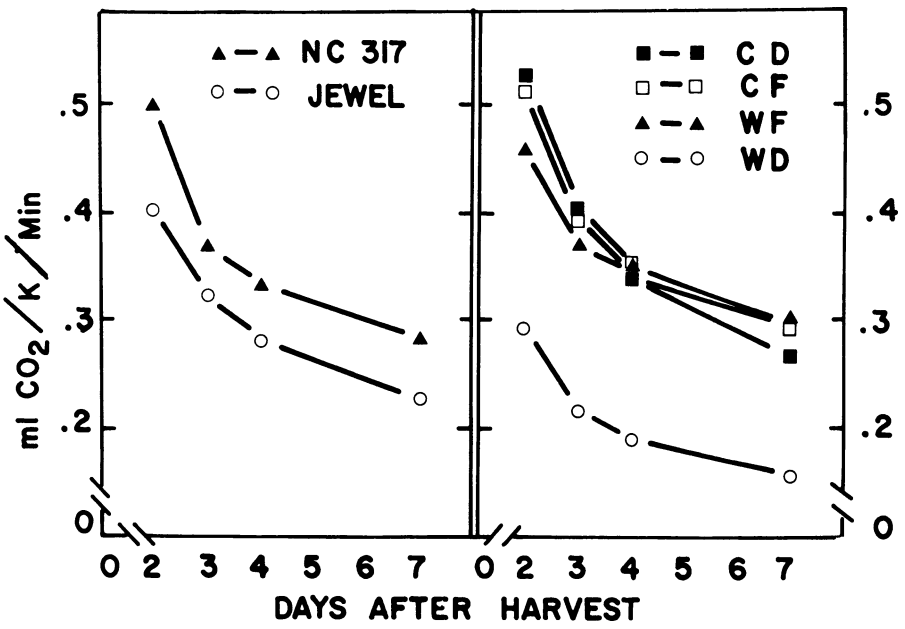

Fig. 2. Respiration rates of roots from sweet potatoes harvested after one week of exposure to warm-dry, warm-flooded, cold-dry, or cold-flooded soil conditions (data for genotypes are averaged over four soil conditions; data for soil conditions are averaged over two genotypes). LSD 5% for testing differences between genotypes within the same day or within different days after harvest is 0.04. LSD 5% for testing differences between days within the same genotype is 0.02. LSD 5% for testing differences between treatments within the same day or within different days after harvest if 0.05. LSD 5% for testing differences between days within the same treatment is 0.03.

dry, cold-flooded) and 4 replications for a total of 64 plots. Each plot consisted of 5 pots with a single plant per pot (a total of 80 pots per genotype).

Roots 3.8 cm or larger in diameter were harvested, cured for 9 days at 29°C, and stored at 13 to 16°C. Roots which showed surface or internal rots were counted and removed from storage 9, 31, 52 and 83 days after harvest. Rotting organisms were not identified. Sprouting was measured 16 days after harvest.

Five uncured, healthy sweet potato roots of similar size from each plot of 'Jewel' and NC 317 were selected for respiration measurements. Roots were washed, dried, and put into respiration chambers (22°C) on the day after harvest. Thirty-two samples (2 genotypes x 4 treatments x 4 replications) were measured at the same time under a constant air flow rate of 40 ml/min. A sample of 0.5 ml of gas was removed from respiration jars and injected into a Fisher-Hamilton Gas Partitioner for analysis of CO_2. Respiration rates are presented as ml CO_2/kg·min. The respiration rates were measured on 2, 3, 4, and 7 days after harvest and were recorded only from roots which looked healthy.

No statistically significant genotype difference in postharvest storage rots was detected in this study. For this reason, all data on preharvest soil conditions are averaged over the 4 genotypes.

The warm-flooded soil condition resulted in a significantly higher level of rotting during the curing process than cold-flooded, cold-dry, and warm-dry treatments (Fig. 1). Rots in roots harvested from warm-dry soil did not increase significantly over the storage period while all other treatments showed significant increases. At the end of the 83-day storage period, the accumulated percentage of rots from the warm-flooded soil treatment was highest followed closely by the cold-flooded treatment. Roots from cold-dry soils began to rot at an increasing rate after 52 days of storage.

Sprouting in 'Jewel' and 'Caromex' was stimulated by the cold treatment (Table 1). In contrast, 'Centennial' and NC 317 had very low sprouting rates. 'Caromex' roots had the highest mean sprouting (43.4%) and the cold-dry soil condition induced the highest sprouting (27.4%) of all treatments.

Respiration rates in roots from cold-flooded, cold-dry and warm-flooded soils (conditions which reduced storage life) were not significantly different from the warm-dry soil treatment. Rates for these treatments were very high immediately after harvest and then began to decrease a few days after harvest. 'Jewel' and NC 317 both reacted similarly to all treatment conditions (Fig. 2). 'Jewel' had a lower respiration rate than NC 317 and both tended to show decreased respiration with storage time. There was no direct correlation between elevated respiration and extent of damage in terms of rotting. No latent response such as that which occurs in rotting during storage was associated with the elevated respiration rates.

In this study, storage rots were most severe when roots were harvested from soils which had been warm and flooded for a week prior to harvest. This increased rotting was detected after 9 days of curing and the accumulated percentage of rotted roots increased during 83 days of storage. Cold-flooded and cold-dry soils also stimulated rotting although these rots did not become significantly different from the

control (roots harvested from warm-dry soils) until much later in the storage life of the roots. After 83 days of storage, roots harvested from cold-dry soils rotted significantly more than the control which showed very little rotting throughout the storage period.

In conclusion, it appears that harvesting roots from warm-flooded soils will result in a high percentage of storage rots; however, harvesting from cold-flooded soils may be more detrimental economically. Rotting of roots from warm-flooded soils is readily apparent after harvest and curing, whereas roots harvested from cold-flooded soils may appear sound at harvest, after curing, and even well into the storage season. These roots may even be sold and begin to rot after the buyer has purchased them. The same is true of roots harvested from cold-dry soils although rotting would occur less frequently. Apparently sound roots which are harvested from warm-flooded, cold-flooded or cold-dry soils should be checked frequently during storage to maintain quality of the marketed product. Roots which appear sound after months of storage may be damaged and, even if rotting is not apparent, quality may be reduced.

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Increased Yield of the Cultivated Mushroom in Israel by Artificial Misting[1]

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Additional index words. Agaricus bisporus, Agaricus bitorquis, Pseudomonas tolaasii

Abstract. **Artificial misting before the first flush, and between all the flushes increased yield of *Agaricus bitorquis* (Quelet) by 33% and up to 75% in *A. bisporus* (Lange).**

Cultivated mushroom yields in Israel are lower than the yields in Western Europe, 12-15 as compared to 20 or more kg/m^2, respectively (3). Thus, mushroom production is an economically hazardous crop.

There are 2 possible explanations for these differences: a) The compost used in Israel may be less effective, it is so-called "synthetic" based on wheat straw and chicken manure instead of the traditionally used horse manure. b) Although most of the modern houses for mushroom production in Israel are fully environment controlled, mechanical failures in the complicated equipment may reduce yield.

The mushroom production procedures used in this investigation were carried out in a modern champignon farm in Zikhron-Ya'acov. Each growing room had an automatic control for cooling or heating and hand-controlled ventilation, circulation, CO_2 and misting. The compost used was the so-called "synthetic" composed of wheat straw, chicken manure, soybean meal and $CaSO_4$ (120 kg/m^2 growth). Growth treatments were similar to those used in Dutch mushrooms farms. Mushroom species used were *Agaricus bisporus* cv. 'Somycel 53' and *Agaricus bitorquis* cv. 'Somycel K-26' which grows best at higher temperature. The ventilation and misting systems are described in Fig. 1. Air regulated to the needed growth conditions was blown through polyethylene sleeves (3-60 cm in diameter) using a constant ventilator. The amount of fresh air that entered the room was hand controlled with a shutter according to the growth stage of the room (10-600 m^3 per 100 m^2

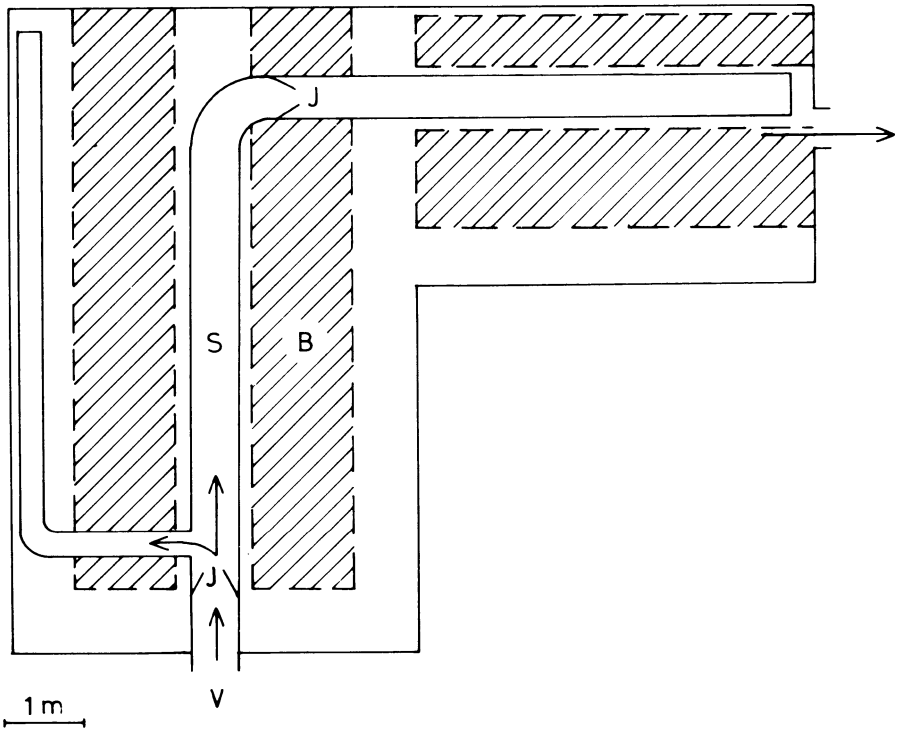

Fig. 1. Ventilation and misting systems inside controlled mushroom production room.
S = polyethylene sleeves V = ventilator
J = mist diffuser jets → entrance and exit of air
B = beds

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