Nitrogen Gas Suppresses Microorganisms on Cranberries in Short Term Storage

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ABSTRACT

At 3.3 C, there was less decay and more physiological breakdown in cranberry fruit stored in an atmosphere of nitrogen than in air. The influence of nitrogen was largely during the first 3 weeks of storage. Less decay developed in cranberries that had been initially stored for 3 weeks in nitrogen, then stored in air, than in berries stored continuously in air. Phytopathology 61:335-336.

Postharvest decay of fruits and vegetables can be suppressed by controlled atmospheres (2, 3). Previous studies (4, 5) demonstrated that low temp and good ventilation are essential in reducing spoilage of cranberries for fresh fruit. Later, Anderson et al. (1) concluded that atmospheres containing various combinations of oxygen and carbon dioxide provided little benefit over conventional air storage. In the present study, the effect of nitrogen (100% N_2) or air on the number of microorganisms and physiological or sterile breakdown is described.

Freshly dry-harvested cranberries, variety Howe, free of decay were selected from a local bog. The average degree of maturity was a rating of 9 as determined by visual comparison with chart produced by Williams and Meyer Co., Chicago, Ill. The cranberries were stored at 3.3 C in opaque containers, each holding 13.5 kg of fruit, in continuous atmospheres of air or nitrogen; subsamples were transferred to air or nitrogen atmospheres at 3-week intervals (Fig. 1). At each 3-week interval, a 200-g sample was removed from each treatment and the amt of decay and physiological breakdown were recorded. A section from each decayed berry was plated on potato-dextrose agar (PDA) to identify any organisms present. Cranberries showing signs of softness with red color throughout the tissue were classified as physiological breakdown. Analyses of variance were conducted on the levels of rots.

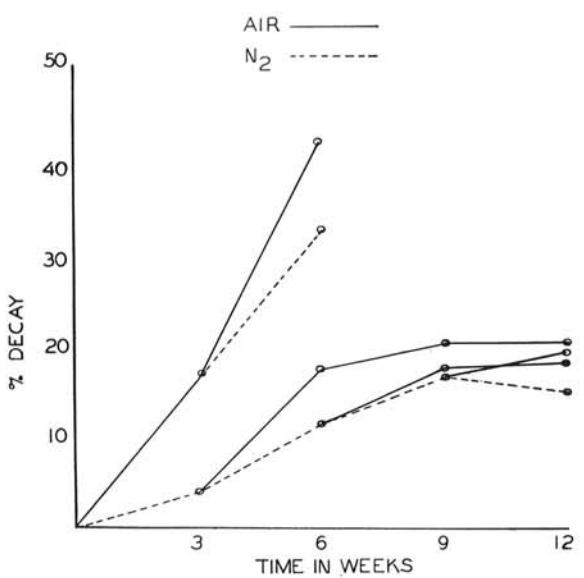

Fig. 1. Decay of cranberries at 3.3 C in continuous air and nitrogen or after transfer to atmospheres of air and nitrogen.

At 3.3 C, there was significantly less decay of cranberries after 3 weeks in nitrogen than in air (Fig. 1). Changing the air atmosphere to nitrogen slowed down the decay significantly. Although changing a nitrogen atmosphere to air after 3 weeks resulted in a significant increase in decay, decay did not increase appreciably in cranberries transferred to air after being stored in nitrogen for 6 or 9 weeks. Three fungi, *Botrytis cinerea* Pers., *Pullularia pullulans* (d By.) Berkh., and *Rhizopus* sp., isolated from air-stored cranberries were not isolated from berries stored in nitrogen. Yeasts were isolated from those in nitrogen but not from those in air.

Other microorganisms isolated from decayed cranberries stored in nitrogen and in air were *Acanthorhyncus vaccinii* Shear, *Ceuthospora lunata* Shear, *Diaporthe vaccinii* Shear, *Godronia cassandrae* Pk.f., *vaccinii* Groves, *Guignardia vaccinii* Shear, *Penicillium* spp., *Sporonema oxycocci* Shear, *Trichoderma viride* Pers., and bacteria.

Anderson et al. (1) found a similar amt of decay in cranberries stored in 1% O_2 and 21% O_2. Apparently the storage atmosphere must be free of oxygen for control of decay.

The increase in physiological breakdown occurred during the first 3 weeks in nitrogen storage at 3.3 C. There was no further increase in physiological breakdown of berries initially stored in nitrogen and held up to 12 weeks in air or nitrogen.

The marked increase in the amt of physiological breakdown of cranberries caused by nitrogen precludes this type of storage for berries to be used for fresh fruit. Stark et al. (6, *unpublished data*) found that berries with physiological breakdown were suitable for cranberry sauce, so nitrogen storage could be used to suppress decay in berries destined for sauce.

LITERATURE CITED

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