

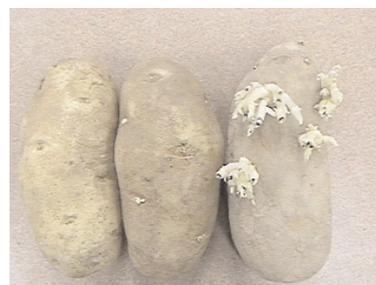
Research

1,4DMN effective for sprout control and quality management

With increasing limitations on the amounts of CIPC that can be applied, store managers are seeking alternatives to maintain the quality of their potatoes during the season. With its ability to inhibit sprouting while mitigating shrink and pressure bruising, 1,4DMN (1,4-dimethylnaphthalene) is growing in popularity for sprout control and quality management.

Potato rest or innate dormancy is a physiologic stage during which tubers are not able to sprout, even under favourable conditions. This naturally occurring event is regulated by endogenous bio-chemicals found within the tuber (reviewed by Hemberg, 1985). As early as 1952, scientists in the UK identified several naturally occurring volatile bio-chemicals that evolve from stored potatoes and began evaluating their ability to suppress sprouting. 1,4-DMN was identified as one of the most potent natural sprout suppressants

the dormant state as it penetrates the skin. So, unlike CIPC, 1,4-DMN does not kill emerging shoots, but prevents sprouts from starting.



The 1,4DMN effect

Just as important, dormant potatoes respire at a lower level, limiting the amount of water and carbon dioxide respired. This reduces shrink and susceptibility to pressure bruise. 1,4-DMN can be used alone or as a supplement to a CIPC program. It is not a herbicide and can be applied immediately after harvest.

Optimal results have been achieved using

Treatment	Concentration (µg/l air)	Average sprout weight per tuber (g)	Sprout weight as % of control	Average length of longest sprout (cm)	Sprout length as % of control
Control	0	9.9	100	17	100
1,4-DMN	11	0.1	1	1	5

Table 1. Effect of 1,4-DMN on sprout growth in a whole-tuber bio-assay with c.v. King Edward. Each sample consisted of 20 tubers and was treated for ca 40 days while stored at 10°C.

found in potatoes. When 1,4-DMN is present in sufficient concentrations, the potato will remain in a dormant state.

A 1984 study by Filmer and Rhodes found fully suppressed sprout growth when liquid 1,4-DMN was applied as an aerosol through an injection port positioned immediately adjacent to the air circulation return site in a container storing potatoes (study published in *Potato Research* 27:383-392)(Table 1).

Filmer and Rhodes demonstrated the highly effective sprout inhibiting capability of 1,4-DMN in a shoot-tip bio-assay. In this assay growing sprout tips showed a strong dose response to 1,4-DMN when treated with varying doses of 1,4-DMN. At a very low dose level of about 30 µM concentration total cessation of sprout growth was obtained.

CIPC has long been the workhorse of sprout control. It works externally on the surface of the potato to prevent peeps or buds from growing into sprouts. As a mitotic inhibitor, it prevents cell division as sprouts begin to develop. Classified as a bio-chemical, 1,4-DMN has a non-toxic action that is entirely different to that of CIPC. It is able to restore or enhance

both CIPC and 1,4DMN in a well-timed application programme designed to accommodate the potato variety, storage facility and weather variables. Ultimately, a well designed storage treatment plan addresses all major quality concerns: pressure bruising, shrinkage and sprouting. Lowering respiration decreases the likelihood of pressure bruise. Reduced shrink and improved sprout control help maintain the firmness of the potato. This results in a higher quality potato for packing and greater insurance for a storage manager's investment.

Available commercially in the US and New Zealand as 1,4SIGHT, regulatory approval is being pursued for 1,4DMN products in Europe. Clint Young, the general manager of Nature's Best Produce Inc, a US growing company, has been using 1,4DMN successfully for a while, and thinks the benefits are immediately apparent. He says: "1,4SIGHT dramatically improves healing, shrink and pressure bruise on our potatoes. We use it on every sack that goes into storage."

For further information:

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