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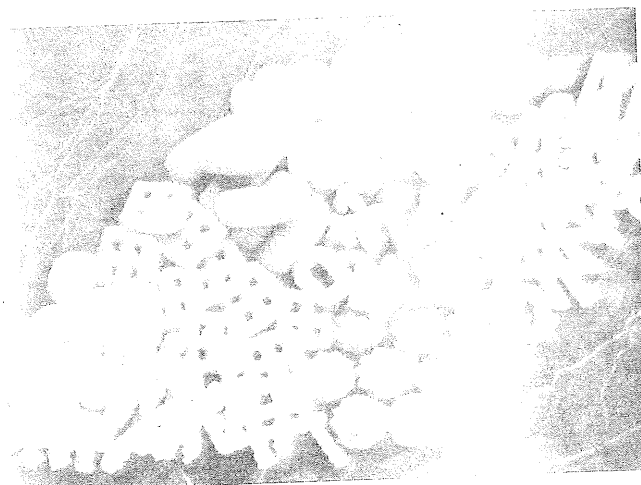
on Potatoprocessing

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Summaries

Potatoes, the most important vegetable



DORMANCY AND SPROUT GROWTH OF (SEED) POTATOES

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Abstract

Introduction and definition of terms

During the growth and storage of potato tubers, the physiological properties of these tubers change with time, which is reflected in a changing sprouting behaviour. Since the real time scale of changes in the sprouting behaviour differs between cultivars and is influenced by storage conditions, the term 'physiological age' of tubers is commonly used. The physiological age of a tuber is reflected in its *potential* sprout growth during storage or its growth vigour (the *potential* to produce a well developed plant within a relatively short period of time) after planting. During the dormancy period tubers show no sprout growth, even under conditions favourable for sprouting. The sprout growth and growth vigour of tubers increase initially upon termination of dormancy, level out at a maximum, and after some time they gradually decline again. The *actual* sprout growth of tubers not only depends on their physiological age but also on the environmental conditions; sprout growth can be suppressed although tubers have the appropriate physiological age to sprout.

Dormancy can be a great disadvantage for seed tubers that have to be planted soon after harvest. However, it is a favourable factor for ware potatoes and for seed tubers that have to be stored for a long period before use or planting. Since it is well-known that dormancy and sprout growth are affected by storage conditions, some seed growers try to shorten the dormancy period and to enhance physiological ageing, whereas ware potato growers try to prolong dormancy and to prevent sprout growth with storage temperatures and chemicals. It is important to have insight in the effect of growth conditions on dormancy and physiological ageing, in order to be able to predict the duration of dormancy and to store the tubers in the proper way. In this paper, an overview is presented of research on factors affecting dormancy and physiological ageing of *seed* potatoes. By discussing these effects some thoughts on the factors affecting dormancy and sprout growth of *ware* potatoes are given. This might help to judge the effects of growth and storage conditions on sprout growth of ware tubers and whether it is possible for a grower to manipulate the sprout growth.

When analysing the effects of growth and storage conditions on dormancy and sprout growth, it is important to discriminate between various processes. *Dormancy* is the physiological state of the tuber in which sprout growth will not occur, even when the tuber is kept in conditions ideal for sprout growth (darkness, 15-20 °C and a relative humidity of 80 %). Usually dormancy of a tuber batch is defined to have ended when e.g. 80 % of the tubers shows at least one sprout 2 mm long. The *physiological age* of a tuber is reflected in the *potential* to form sprouts or plants. The *actual sprout growth* or growth of plants also depends on the environmental conditions.

Research on seed potatoes

Most results about effects of growth and storage conditions discussed in this paper were obtained in experiments with seed crops in which the haulm was destroyed ca 90 days after planting. In experiments investigating the effect of growth conditions, the growth conditions were varied after tuber initiation so that tubers from different treatments were of the same chronological age. Tubers were stored in darkness from harvest onwards at 18 °C and 80 % RH. Effects of storage temperature regimes were investigated by storing the tubers in darkness and 80 % RH at different temperatures (including 18 °C). The duration of dormancy can be expressed in several ways: days after planting, days after tuber initiation, days after haulm killing, days after harvest or calendar date. In this paper the dormancy duration is expressed in days after haulm killing.

The following growth and storage factors will be discussed in the presentation:

- pre-sprouting of the mother tubers and planting date of the mother crop;
- growth conditions: nitrogen supply, temperature, light intensity and photoperiod;
- date of haulm removal;
- duration of the hardening period in the field;
- storage temperature regimes.

Effects on seed tubers

The effect of growth factors on the *duration of dormancy* of seed tubers is very limited. Generally, maximum differences in dormancy between tuber batches because of differences in growth conditions are much less than 3 weeks. Even high temperature during tuber growth hardly affected the duration of dormancy. On the contrary, immediately after haulm removal the temperature is extremely important. Compared with storage at 18 °C dormancy can be shortened with maximally 6-7 weeks by regimes with low (2 °C) or high (28 °C) storage temperatures. The effects seemed to be larger in storage regimes started immediately after haulm killing than in those started later.

The results with the growth and storage factors suggest that as long as tubers are attached to the green foliage, the influence of the environmental conditions on the duration of dormancy is limited. There seems to be a kind of controlling influence of the foliage on the dormancy of the tubers.

Effects of the growth and storage conditions on the *physiological age* (sprouting behaviour) of the tubers could not always be explained/predicted with the effects on dormancy. For instance, high temperatures during tuber growth enhanced sprout growth although the dormancy period was not shortened. It seems that dormancy release and physiological ageing are independently regulated phenomena.

Elaborative thoughts of effects on ware tubers

Maturely harvested ware crops/potatoes differ in the following respects from immaturely harvested seed crops/tubers:

- their growth period is much longer;
- during the second part of the growing season the foliage ages;
- haulm killing, harvest and start of storage are much closer to the natural end of dormancy.

These facts give rise to the following speculations on the effect of growth and storage conditions on dormancy and sprout growth of ware tubers.

1. The effect of growth conditions on dormancy is greater for ware potatoes than for seed tubers, since the growth period of ware potatoes is much longer and the controlling influence of the ageing foliage decreases.
2. The potential effect of storage conditions on dormancy of ware potatoes is smaller, since the tubers are closer to their natural end of dormancy.

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