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# UNITED STATES PATENT OFFICE

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## ARTICLE FOR USE IN THE TREATMENT OF LEAFY VEGETABLES

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4 Claims. (Cl. 99—193)

This invention pertains to an article of commerce particularly adapted for use in treating leafy vegetables and, in its more specific form, is directed to an article of commerce in the form of a fibrous sheet for use in the treatment of lettuce and romaine for the purpose of inhibiting the darkening of the butts of such vegetables during shipment.

A large proportion of the leafy vegetables are shipped long distances to points of consumption. During such shipment portions of such vegetables, particularly the stem or butts, have a tendency to discolor and develop a reddish cast. As a result, the purchaser immediately becomes cognizant of the fact that the vegetable is not fresh and very often the consumer must remove a section of the stem or butt and perhaps some of the outer leaves in order to remove the portions which have been discolored. This discoloration is apparently due to certain oxydases present in the vegetables, which oxydases exude through the stem or butt and through bruised areas on the ribs. Copending applications filed by me have disclosed methods of treating the cut stems or butts of leafy vegetables for the purpose of inhibiting the discoloration during storage and shipment. The present invention is directed toward certain modifications of the process.

In my co-pending application Serial No. 322,209 (which has matured into Patent No. 2,215,446) I have described and claimed a method of inhibiting the discoloration of butts of leafy vegetables by applying thereto an absorbent material containing certain reducing agents. The present invention is directed toward means whereby the same end result may be attained by different means.

When leafy vegetables, such as romaine or lettuce, are shipped from the packing houses to the urban centers of consumption, it is customary to crate the vegetables and to place layers of crushed ice between layers of the vegetables in the crates. It has been found that in the event the butts are sprayed with an aqueous solution of one of the reducing agents particularly adapted for this purpose and such sprayed butts are then covered with crushed ice, the inhibition period is relatively short. It is believed that during shipment the crushed ice melts slowly and removes and washes away whatever small amount of reducing agent solution may be left upon the butt as a result of the spraying, dipping or swabbing operation.

I have found that it is not always necessary to spray the butts with one of the reducing agents previously mentioned and that instead, good results can be obtained by placing a sheet of fibrous material over the upturned butts of lettuce in a crate, said sheet containing an alkali or alkali metal salt of an acid from the group of hyposulfurous, sulfurous, pyrosulfurous and thiosulfuric acids. These compounds may be incorporated in the paper during manufacture thereof. Either immediately prior to or shortly after the sheet of paper is applied to the butts, the paper is moistened with water. Instead of moistening the paper with water, suitable moisture may be derived from the crushed ice which is ordinarily placed between layers of lettuce in a crate, the melting ice being absorbed by the paper during shipment.

An object of the present invention is to disclose and provide, as an article of commerce, an absorbent material in sheet form, said material containing ingredients and compounds capable of inhibiting the darkening of butts when said sheet material is placed thereover.

This and other objects of the invention will become apparent to those skilled in the art from the following description thereof.

A material suitable for use in the process of this invention comprises an absorbent paper somewhat similar in texture, pliability and porosity to blotting paper. Suitable absorbent sheet material should weigh not less than about 140 pounds per ream and papers weighing 240 and even 320 pounds per ream have been successfully used.

During the process of manufacturing such paper, alkali and alkali earth salts of acids from the group of hyposulfurous, sulfurous, pyrosulfurous and thiosulfuric acids should be incorporated therein in an amount sufficient to impart to such paper a content of not less than 1.5% by weight of $SO_2$. Larger amounts are preferable, for example, amounts of between 2% and 4%. Sulfite paper or papers made from an incompletely washed chemical pulp made by the sulfite process (preferably with a high content of magnesium sulfite and magnesium thiosulfite) are highly desirable, although a sufficiently large content of the corresponding calcium compounds is also satisfactory.

Other compounds which may be incorporated in such sheet materials comprise sodium thiosulfate, the metabisulfites, sodium potassium or calcium hyposulfite. Compounds having a relatively low dissociation constant are preferred

since with such compounds the degree of ionization increases with dilution.

This sheet material may be applied so as to cover the upturned butts of a layer of lettuce and such sheet either sprinkled with water after placement upon the butts or such sheet may be dipped or moistened with water prior to placement thereof upon the butts. As previously stated, the moistening step may in some instances be eliminated provided, however, a layer of crushed ice is placed over the sheet, water from the melting ice being absorbed by the sheet during shipment. The moisture which ordinarily exudes from the butts, as well as the moisture derived from the sprinkling or dipping operations or from the ice, dissolves the chemicals included in the paper and reaction takes place between such dissolved chemicals and the exudations from the butts, whereby darkening is inhibited or reduced for a prolonged period of time. It may be that the carbonic acid content of the exuded juices reacts with the chemicals somewhat as follows:

$$CaSO_3+2H^+=Ca^{++}+H_2SO_3$$

In some instances, particularly where the paper contains a relatively high content of sulfites, the water used in moistening the sheets may contain a slight quantity of acid, either mineral or organic, for the purpose of facilitating the release of $SO_2$ therefrom.

The relatively heavy paper to which specific reference has been made not only assures the presence of a sufficiently large quantity of the desired chemicals, but in addition acts as a buffer in spacing the crushed ice from the lettuce, thereby preventing the lettuce from being injured by the sharp edges and pieces of ice.

It will be found that lettuce packed in the manner described can be shipped to distant markets and be received there in a greatly improved condition in comparison with lettuce shipped without such treatment.

This application is a continuation-in-part of the previously mentioned co-pending application Serial No. 322,209.

I claim:

1. As an article of commerce for use in packing leafy vegetables, a fibrous sheet containing a sulpho compound, said compound being present in an amount sufficient to impart a content of not less than 1.5% $SO_2$ by weight to said sheet.

2. As an article of commerce for use in packing leafy vegetables, a fibrous sheet weighing not less than 140 pounds per ream, containing a sulpho compound, said compound being present in an amount sufficient to impart a content of not less than 1.5% $SO_2$ by weight to said sheet.

3. As an article of commerce for use in packing leafy vegetables, a fibrous sheet containing a sulpho compound from the group of alkali and alkali earth salts of hyposulfurous, sulfurous, pyrosulfurous and thiosulfuric acids, said compound being present in amount sufficient to impart a content of not less than 1.5% $SO_2$ by weight to said sheet.

4. As an article of manufacture, absorbent paper having incorporated therein a sulpho compound from the group of alkali and alkali earth salts of hyposulfurous, sulfurous, pyrosulfurous and thiosulfuric acids, said paper containing said sulpho compound in amounts sufficient to impart a content of not less than 1.5% $SO_2$ by weight.

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