Patented Sept. 17, 1940

2,215,446

UNITED STATES PATENT OFFICE

2,215,446

METHOD OF TREATING THE BUTT ENDS OF VEGETABLES

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No Drawing. Application March 4, 1940, Serial No. 322,209

10 Claims. (Cl. 99—193)

This invention relates generally to methods of preserving the appearance and condition of food. More particularly the invention is concerned with a method of treating certain vegetables such as lettuce, endive, cauliflower and the like to preserve the fresh appearance and condition of the severed butt ends of the vegetables.

Although the invention herein particularly described is a method of treating lettuce and in the description of the method lettuce will be particularly referred to and used as an example, the method is also useful for treating other vegetables of a similar nature such as, for example, endive.

Nearly all of the large consumption points of lettuce are several days removed from the major sources of supply, as a large amount of lettuce sold in the midwest and eastern markets is shipped from California, Arizona and other western States, and it ordinarily takes five or six days to reach Chicago and seven or eight days to reach New York.

The ordinary way of handling lettuce for long distance shipping is that the lettuce is brought in from the fields to the packing house where each head is individually handled by a person who slices off a portion of the butt. The lettuce is then packed in crates with the butt ends up. Usually between each layer of lettuce in the crate there is placed a layer of crushed ice. Preferably the entire crate is then subjected to a shower bath of water which washes the top layer of lettuce. Then it is ordinarily the custom to place a wet sheet of absorbent paper over the top layer of lettuce and a layer of crushed ice over the paper. The paper serves the purpose of catching any dirt from the melting ice during shipment and of keeping the lettuce moist. The top of the crate is then attached.

It has been found that when so packed, the butt ends of the lettuce discolor rapidly. When the lettuce is packed in ice as above described, the discoloration usually takes place in approximately three days, while in cases where the lettuce is dry packed without refrigeration, the butts will discolor usually in about 24 hours.

The discoloration of the lettuce butts is a great disadvantage to the growers and/or shippers of the lettuce for the reason that the buyers at the various markets base their prices for any one size upon the fresh appearance of the lettuce and the discoloration of the butt ends tends to detract from the fresh appearance. There is, therefore, a demand by growers and shippers for some means of preventing the discoloration of the butt ends during shipment because lettuce with fresh appearing butt ends can be expected to bring better prices or sell quicker than the lettuce with discolored butt ends.

In view of this situation various attempts have been made to prevent discoloration of the butt ends of the lettuce and to preserve the general appearance and condition of the head. These attempts have involved the coating of the butt ends of the lettuce with some coating material in an attempt to keep away air to prevent oxidation and the reddish brown discoloration. To the best of my knowledge, none of the various attempts has been successful.

An example of a process that has been tried commercially but has not met with acceptance by the growers is the coating of the butts with volatile organic solvents, containing lacquer materials such as cellulose acetate and the like. It has been found that when the butt is so treated the lacquer does not have any chemical action on the milk exuded from the butt and it does not form an adhesive film and fails to prevent discoloration. A further objection to this process is that the film is very apparent and unsightly.

Therefore, it is a primary object of this invention to provide a new and improved method of treatment to prevent the discoloration of the butt ends of vegetables which have a head which is severed from the remainder of the growing plant and when so severed have a butt end which discolors.

It is also an object of this invention to provide a method of packing lettuce and similar vegetables which will insure the preservation of the appearance and condition of the butt ends of the vegetable for several days without discoloration.

It is a further object to provide a method which is inexpensive and flexible and which may be varied to meet the different conditions desired by various growers and shippers to preserve the butt ends of the lettuce or similar vegetable for various lengths of time as desired.

It is also an object of this invention to provide a method of the type indicated which does not leave any toxic or harmful ingredients upon the lettuce after treatment. It is a further object to provide a method which does not leave an unsightly coating on the butt ends of the vegetables. A still further object is to disclose a method of inhibiting the discoloration of the stem or butt ends of lettuce and the like by means of specified chemical solutions under specified conditions.

These and other objects will be apparent from the following description of the process.

Taking lettuce as an example, after the head has been severed from the remainder of the plant, the butt exudes a milky juice which is believed to contain oxidizing enzymes which hasten the oxidation of the severed butt with its attendant discolorations. This invention consists in the application of a water soluble reducing agent (from a group of substances hereinafter defined) to either the entire vegetable or merely to the severed butt to preserve the fresh and white appearance of the butt during shipment.

I have found that in general normally solid, water soluble reducing agents which contain an active sulfur group are particularly well adapted to the purpose of this invention. More particularly I have found that sodium thiosulfate ($Na_2S_2O_3.5H_2O$), commonly called "hypo," which is familiar to photographers and is readily available in large quantities, is eminently suited to prevent the discoloration of the butt ends of vegetables. While my invention applies to the application of any one of a number of normally solid, water soluble reducing agents to the butt ends of vegetables, I shall, for the purpose of a clear disclosure confine most of my description to the use of sodium thiosulfate.

Various results can be obtained depending upon the strength of the solution applied to the lettuce. For example, it has been found that a weak solution of sodium thiosulfate, say 5% (by weight) when applied directly to the butt ends of lettuce, will prevent discoloration for approximately 48 hours; that a stronger solution of approximately 30% will prevent discoloration for about 6 days; and that a solution of approximately 50% will prevent discoloration for 9 days or longer. It is not desirable to employ more than a 50% solution for the reason that there is a slight astringent action which takes place upon the application of strong solutions and if more than a 50% solution is used, this may become too severe and noticeable.

It is contemplated that the solution may be applied in various ways, for example, the entire head may be sprayed or dipped or the solution may be merely sprayed, sponged or painted on the butt or the butt may be dipped in the soultiton. Preferably, the solution should be applied to the butt within a short time after the butt has been freshly severed.

One method of applying a weak solution of the chemical to the lettuce butts over a relatively long period of time as, for instance, during shipment, consists in the use of a porous member which has been impregnated or coated with the chemical. As an example, paper can be used for this purpose and placed directly over the butt ends of the lettuce heads which it is desired to treat and preserve. The impregnated or coated paper used could be furnished to the packing houses in a dry condition and in such cases it would be necessary to either wet the paper directly with water at the time of application or shortly thereafter, or to place over the dry paper a layer of crushed ice which would gradually wet the paper and carry the chemical in a weak solution to the butt ends of the vegetables. Where ice is placed directly over the impregnated or coated paper, it is desirable but not necessary to place the paper directly in contact with the butt ends of the vegetables since the water from the melting ice passing through the paper carries the solution to the vegetables. However, where no ice is used, the paper (moistened with chemical solution) should be placed in contact with the butt ends of the vegetables so that the chemical solution can travel through the paper into the butt ends of the vegetables. It is also contemplated that absorbent members such as paper, blotters or the like can be dipped in a solution of the chemical at the packing houses and laid over the butt ends of vegetables.

By the above discussed methods of applying the chemical by utilizing an impregnated paper or the like, it is possible to apply a relatively weak solution of the chemical to the vegetables over a long period of time and thereby achieve the result of preserving the butt ends of the vegetables for a long period of time without discoloration to the same extent as would be possible by initially applying a strong solution of the chemical to the butt ends of the vegetables and at the same time there is no danger of the astringent action taking place by these methods which would be expected with the application of a very strong solution.

I have found that where it is desirable to use a concentrated solution such as for instance over 50% of sodium thiosulfate with the attendant risk of excessive astringent action, good results can be obtained with a much weaker solution such as for instance a 10% to 20% solution of sodium thiosulphate when applied through the use of a porous impregnated member such as absorbent paper as directly mentioned above. Generally speaking solutions containing from 5% to about 30% of sodium thio-sulphate answer all normal requirements.

Although the invention has been described with reference to a particular vegetable, it is contemplated that the method is useful for the preservation of the butt ends of other vegetables than the particular example given and although the reference has been made to the use of sodium thiosulfate in carrying out the purpose of my invention, it is contemplated that other normally solid, water soluble reducing agents which are substantially non-toxic when employed in the process of this invention can be used. Sodium thio-sulphate is one example of a normally solid, substantially non-toxic agent and exemplifies a suitable water soluble salt of thio-sulfuric acid. Sodium hypo-sulphite ($Na_2S_2O_4$) is another normally solid reducing agent and exemplifies a water soluble salt of hypo-sulphurous acid ($H_2S_2O_4$). Sodium metabisulphite ($Na_2S_2O_5$) is an example of a useful reducing agent which is a salt of pyro-sulphurous acid ($H_2S_2O_5$). True sulphates and normally gaseous sulphur compounds are not effective in preventing discoloration during shipment.

I claim as my invention:

1. In a method of inhibiting the darkening of butt ends of vegetables during shipment, the steps of: making an aqueous solution containing from 5% to about 30% by weight of sodium thiosulphate and moistening a porous, fibrous carrier with said solution and covering the butt ends of vegetables with such moistened carrier.

2. In a method of packing lettuce for shipment which comprises placing a layer of lettuce with butt ends up in a crate, covering said butt ends with a sheet of absorbent material carrying sodium thio-sulphate and placing crushed ice in said crate above said sheet and out of direct contact with said layer of lettuce.

3. In a method of inhibiting the discoloration of butt ends of lettuce during shipment, the steps of: making an aqueous solution containing from 5% to about 30% by weight of sodium thiosulfate, moistening an absorbent material with said

solution, and covering the butt ends of lettuce with such moistened material.

4. In a method of inhibiting the discoloration of butt ends of vegetables during shipment, the step of: covering the butt ends of vegetables with an absorbent material containing an aqueous solution, said solution containing from 5% to about 50% of a reducing agent comprising a normally solid, substantially non-toxic, water-soluble salt of an acid from the group of thiosulfuric, hyposulfurous and pyrosulfurous acids.

5. In a method of inhibiting the discoloration of butt ends of lettuce during shipment thereof, the step of: covering the butt ends of lettuce with an absorbent material containing an aqueous solution, said solution containing from 5% to about 50% of a reducing agent comprising a normally solid, substantially non-toxic, water-soluble salt of an acid from the group of thiosulfuric, hyposulfurous and pyrosulfurous acids.

6. In a method of inhibiting the discoloration of butt ends of lettuce, the step of: covering the butt ends of lettuce with an absorbent material containing an aqueous solution, said solution containing from 5% to about 50% of sodium thiosulfate.

7. In a method of inhibiting the discoloration of butt ends of vegetables during shipment thereof, the steps of: covering the butt ends of vegetables with an absorbent material carrying a reducing agent comprising a normally solid, substantially non-toxic, water-soluble salt of an acid from the group of thiosulfuric, hyposulfurous and pyrosulfurous acids, and placing crushed ice above said material.

8. In a method of inhibiting the discoloration of butt ends of lettuce during shipment thereof, the steps of: covering the butt ends of lettuce with an absorbent material carrying a reducing agent comprising a normally solid, substantially non-toxic water-soluble salt of an acid from the group of thiosulfuric, hyposulfurous and pyrosulfurous acids, and placing crushed ice above said material.

9. In a method of inhibiting the discoloration of butt ends of lettuce during shipment thereof, the steps of: covering the butt ends of lettuce with an absorbent material containing an aqueous solution, said solution containing from 5% to about 50% by weight of a reducing agent comprising a normally solid, substantially non-toxic, water-soluble salt of an acid from the group of thiosulfuric, hyposulfurous and pyrosulfurous acids, and placing crushed ice above said material.

10. In a method of inhibiting the discoloration of butt ends of lettuce during shipment thereof, the steps of: covering the butt ends of lettuce with an absorbent material containing an aqueous solution having a content of from 5% to about 50% by weight of sodium thiosulfate, and placing crushed ice above said material.

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