



IV3

**Vegestar
Vegesan
Vegescor**



Integrated system of chemicals for the antiseptic washing and antioxidant treatment of fruits and vegetables of IV range

Introduction

Fruit and vegetable products of IV range are all those varieties of fresh fruit and vegetables subjected to industrial processes, characterized by minimum treatments, that allow you to obtain products ready for raw consumption with particular regard to hygiene, organoleptic and nutritional characteristics and the achievement of a shelf-life to be able to allow its sale on the shelves of large-scale retail trade.



The industrial processes used in the production of IV range fruit and vegetables consist, generally, of a washing step with drinking water or treated with sanitizers permitted by current regulations, of a cutting phase, where is permitted the use of antioxidant agents authorized for use in direct contact with food, a drying phase by drying tunnel or centrifuges and finally a packaging, generally in a modified atmosphere, in bags or trays of plastic films with characteristics that allow an optimal entry of air into the packaging in order to avoid anaerobiosis but, at the same time, restrict the entry of large amounts of oxygen which accelerates the process of deterioration of the product.

V³ system and application principles

V³ is an integrated system of three chemicals that have different but synergistic functions, in the treatment of vegetables for the production of IV range, whose active ingredients were chosen in compliance with the requirements of European regulations that govern the use of products chemicals in industrial processes of antiseptic washing of fruits and vegetables and following the guidelines of the "**Regulation no 21 FDA CFR par. 173 315 - Chemicals used in washing or to assist in the peeling of fruits and vegetables**".



Assuming that the various processing phases fruit and vegetable products of IV range have as their aim to obtain a product hygienically safe and ready for consumption, with organoleptic qualities almost unchanged compared to the fresh product, the chemicals used as detergents/sanitizers and antioxidants shall be such as to produce a high hygienic standard of the product, without altering the taste, color and texture and without compromising the health and safety of the consumer. On the basis of this premise, AQUOS has formulated the products **Vegestar**, **Vegesana** and **Vegescor** to be applied in distinct and subsequent phases of washing of IV range products as indicated in the table below:

PRODUCT	FUNCTION	STEP MANUFACTURING
Vegestar	Detergent/sanitizing	1 st washing tub
Vegesana	Sanitizing chlorine-active	2 nd washing tub
Vegescor	Organic deoxygenating	3 rd washing tub

The above table describes a washing system structured in three successive phases where the fruit or vegetable product, once cut, is transported by the conveyor belt in a first washing tub where is added the detergent/sanitizing, then follows the passage in a second washing tub, where is applied the sanitizing chlorine-active and finally, is performed a third washing of the product with an organic active principle with deoxygenating action that preserves the vegetables from the subsequent oxidation, with particular reference to the part being cut and thus more exposed to natural oxidation processes.

The choice of the phase of washing with detergent is based on the consideration that certain vegetables, especially some veggies, in the winter months and in places with high intensity pluvial, are particularly dirty with soil and organic material that, by its nature, reacts with chlorine or active oxygen of sanitizing reducing the their activities; this phenomenon involves a higher demand for sanitizing for the abatement of the bacteria and, therefore, increased oxidative stress on vegetables particularly sensitive to the oxidant action such as iceberg and lettuce hearts. Then, using a detergent are reduced the washing time and the consumption of water in the first washing phase and decreases the demand for sanitizing that determines not only a lower oxidative stress for the vegetables, but, in the case of chlorine-active sanitizers, you avoid the possible formation of harmful compounds such as chloramines and trihalomethanes by the reaction of chlorine with organic substances.

The following describes the main characteristics, functions, methods and application principles of the above mentioned chemicals:



Vegestar has a detergent action and is used to remove completely organic dirt present on the vegetables which, if not removed, it requires a greater demand for chlorine-active sanitizing during the passage of the vegetables in second washing tub. Furthermore, since the product contains lactic acid, together with the action detergent, also has a slight sanitizing and bacteriostatic action, that reduces , in second washing tub, the demand for chlorine-oxidant.

The normal concentration of use of the product is equal to 0.1 ÷ 0.2% w/v (1 to 2 kg of product per 1000 liters of washing water).



Vegesana is a sanitizing product, based on chlorine-oxidants stabilized in saline solution. If in the first washing tub has been used the product Vegestar, the optimal concentration of use of the product is generally equal to 0.2% in w/v (2 Kg of product per 1000 liters of washing water). It is a very low concentration that allows to obtain the sanitizing action but, at the same time, to preserve the appearance of the vegetables and avoid the

possible formation of harmful compounds such as chloramines and trihalomethanes.





Vegescor is a product containing deoxygenating substances approved by FDA (Food & Drug Administration) as food additives (ascorbic acid - citric acid). The optimal concentration of use of the product, taking into account that in second washing tub uses a reduced concentration of sanitizing with oxidant action, is approx. 0.3 to 0.4% w/v (3 to 4 kg of product per 1000 liters of washing water).

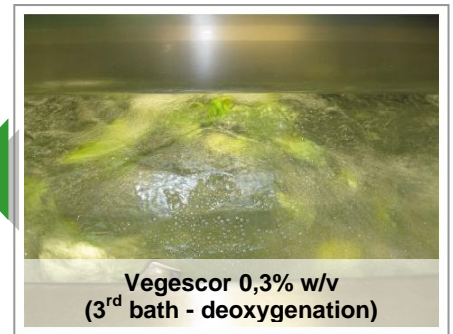
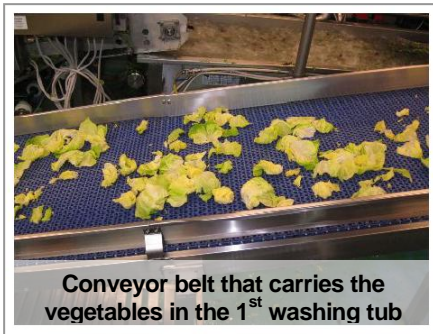
An application example on iceberg

Among the various application tests conducted on different types of vegetables we briefly describe below, using some images, a test on "iceberg" in a company specializing in the production of fresh-cut salads.

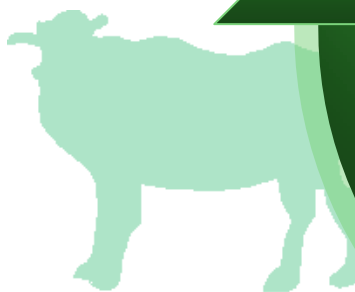
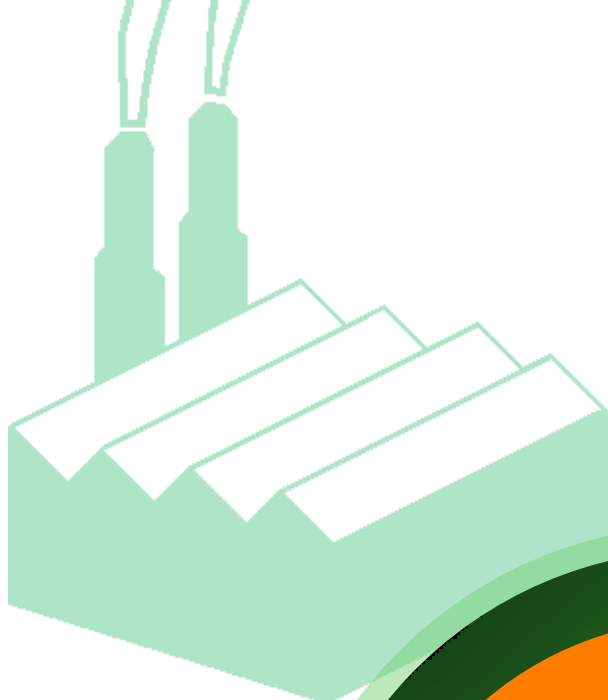
Was chosen to run tests on the iceberg because it's particularly critical in terms of susceptibility to oxidative processes that determine, after wrapping salads, reddish coloration on the leaves, especially on exposed areas after cutting.

To perform this tests, the company has decided to use the production line characterized by the tubs each with a capacity of 1000 liters:

- 1) in the first washing tub was added **Vegestar** at a concentration of 0.2% w/v (2 Kg in 1000 liters of water (washing step);
- 2) in the second washing tub was added **Vegesan** at a concentration of 0.1% w/v (1 Kg of product per 1000 liters of water (sanitisation phase);
- 3) in the third washing tub was added **Vegescor** at the concentration of 0.3% w/v (3 Kg of product per 1000 liters of water (de-oxygenation phase).



After eight days of cold storage (8 ÷ 10 °C) the organoleptic properties of the product have remained almost unchanged; in particular, the leaves of iceberg were turgid as the fresh product and without any reddish coloration along the exposed areas after cutting. The total bacterial count was within the limits of the law and in line with the average of results obtained with other treatments much more oxidative and with a high content of active chlorine: these results support the hypothesis upon which is based the theory of the application of **V³** system of AQUOS.



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...a little magic for a perfect clean

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