

Enhancement of lesser quality kiwifruit for size and shape for the production of naturally rich in functional compounds to human metabolism snack

Riferimenti

Tipo di progetto

Gruppo Operativo

Acronimo

ValKiSnack

Tematica

Mercato e sicurezza alimentare

Information

Time frame

2017 - 2019

Durata

24 months

Partners (no.)

9

Regione

Emilia-Romagna

Comparto

Frutticoltura

Localizzazione

ITH57 - Ravenna

ITH58 - Forlì-Cesena

Costo totale

€196.498,74

Fonte di finanziamento principale

Programma di sviluppo rurale

Programma di sviluppo rurale

2014IT06RDRP003: Italy - Rural Development

Programme (Regional) - Emilia Romagna

Parole chiave

Waste, by-products and residues management

Food quality / processing and nutrition

Sito web

<http://www.naturanuovaspaconsortile.it/2019/03/26/valkisnack-2/>

Project status

completed



Objectives

The functional recovery of kiwifruit production waste through a first processing for the obtaining of high functional content fruit snacks is the general objective of the project.

Currently, less valuable fruit for size and shape are considered waste and poorly paid as used in the production of fruit juices or in biogas plant. The production of snacks with high nutritional features (vitamins, minerals and dietary fiber) is a valid alternative for enhancing the benefits of waste, with positive economic impact on the entire production chain.

Activities

The plan provides for the exercise of cooperation (coordination); market analysis for fruit snacks; environmental impact analysis; profitability analysis; monitoring of phenomena affecting the waste and development of a forecasting model to plan the activities of processing; waste characterization; development of a primary processing in laboratory scale, fruit snack characterization; scale-up of the production process on industrial scale; estimation of energy potential of cutting waste; raising awareness among pupils of the schools on the importance of a diet rich in nutrients.

Context

The impact of production waste in kiwifruit culture is very high both in quantity and in economic terms.

In Hayward variety, production waste, defined as undersize fruit or fruit with shape defects, had an incidence between 4% and 7% of the total production in the period 2013 - 2016. From an economic point of view, production waste contributed to gross farmer income of Hayward kiwi with an incidence between 0,34% to 0,56% in the same period. These numbers are even more

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2/7

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impactful if the analysis is carried out considering the Jintao variety. From data provided by the Consortium Kiwi Gold, production waste has had an incidence between 17% and 23% in the period 2013 - 2016. The value of the impact of waste on the total Gross Farmer Income in Jintao kiwi in the considered years, was between 0.19% and 1.25%.

If in the green Hayward kiwifruit the value assigned to the waste it is constant in the four reference years (80 € / t or 7% of first choice green kiwi value and 10% of second choice green kiwi value), in the yellow Jintao kiwi, this value is extremely variable over time: 27 € / t in 2016 (corresponding to 0.85% of first choice yellow kiwi and to 0.95% of second choice yellow kiwi value), 54 € / t in 2015 (corresponding to 1.76% of first choice value and to 2.26% of second choice value), € 153 / t in 2014 (corresponding to 4.46% of first choice kiwi value and 6.64% of second choice kiwi value) and 89 € / t in 2013 (corresponding to 2.83% of first choice kiwi value and 4% of second choice kiwi value). Such variations are closely related to the use of waste in the industry for the production of fruit juices or their exploitation in the energy supply chain of anaerobic digestion.

Partenariato

Role	Azienda	Address	Telephone	E-mail
Partner	Areté srl	Via del Gomito 26/4 40127 Bologna BO Italy	051 4388500	lgruppioni@areteonline.net
Partner	Consorzio Kiwigold S.r.l. Consortile	P.le Caduti del Lavoro 200 47522 Cesena FC Italy	054 7317476	
Partner	Azienda Agricola Ca' Dell'Antonio S.S.	Via F.lli Cervi 4 48032 Casola Valsenio RA Italy	0542 666032	Agricola.montecchio@legalmail.it
Partner	IRECOOP Emilia- Romagna	Via Calzoni, 1/3 40128 Bologna BO Italy	051 7099011	sede.regionale@irecoop.it

Valorizzazione dei kiwi di minor pregio per dimensione e forma per la produzione di snack naturalmente ricchi di composti funzionali al metabolismo umano

3/7

<https://www.innovarurale.it/pei-agri/gruppi-operativi/bancadati-go-pei/valorizzazione-dei-kiwi-di-minor-pregio-dimensione-e>

Role	Azienda	Address	Telephone	E-mail
Leader	Jingold	P.le Caduti del Lavoro 200 47522 Cesena FC Italy	0547317476	jingoldspa@legalmail.it
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Partner	Dipartimento di Scienze e Tecnologie Agro-Alimentari - DISTAL Università di Bologna	Viale Fanin 44 40127 Bologna BO Italy	051 2096240	distal.amm.dipartimento.respammgest@unibo.it

Pratiche abstract

Description

COORDINATION

Coordination activities between the partner of the Operative Group (OG) will be entrusted to the Consortium Kiwi Gold, Lead Partner, which will play a liaison between the members of the OG as well as the interface between the OG and the public administration. Meetings are scheduled monthly or bi-weekly (depending on the project phase) between the leader and the individual members of the GO involved at different stages, in order to closely monitor the performance of activities, ensure compliance with project deadlines and encourage the information flow between the partners involved.

Consortium will also provide for coordination meetings with all the members of the OG every two months with the aim of assessing the progress reports, plan the next steps, take any corrective or preventive measures. A resource specifically identified within the project leader (consortium) will be responsible for the bureaucratic and administrative aspects related to the exercise of cooperation.

Description

FRUIT SNACKS MARKET ANALYSIS.

The market analysis consists of the following steps:

- Analysis of the external environment:

In the course of this activity, the dynamics characterizing the field of snacks made from fruit in the world, European and Italian level will be analyzed, with the aim to describe the main trends and identify issues and opportunities for kiwi snack.

The analysis will be conducted at the product level below snacks identifying categories to the base of the different fruits and with particular regard to those obtained by a single process of transformation that allows maintain the intrinsic properties of the fruits. The analysis will consider a five-year period.

The offer and the evolution of demand, trade flows, the players of the sector will be analyzed.

- Analysis of the potential market outlet of kiwifruit-based snacks.

For the purposes of market analysis, the characteristics of the product must be defined in terms of:

nutritional properties,

use,

shelf life;

environmental sustainability of the product which may be decisive for certain types of consumer.

Definition of markets to place the product is the basis for the subsequent analysis. Some of the identified potential markets may be the market for health products, breakfast products or recreational products.

Description

ANALYSIS OF THE INCOME GENERATED FROM PROCESSING AND DISTRIBUTION OF THE PROFITABILITY ALONG THE PRODUCTION CHAIN

Starting from an analysis of the amount and the present value of production waste, after achieving an accurate analysis of the snacks production costs during the manufacturing process, even considering the price at which they can be sold to be competitive with "classic" snacks currently available, although not with nutritional properties, the hypothesis of the sale price of different snacks object of study of this operational plan will be formulated. The distribution of the new product value on the individual subjects of the production chain will be evaluated.

Description

ANALYSIS OF THE ENVIRONMENTAL IMPACT OF THE KIWI FRUIT BEFORE AND AFTER WASTE IMPROVEMENT

During the monitoring foreseen in the specific action, all the information related to the inputs needed for the cultivation of one hectare of kiwi Jintao and one hectare of Hayward kiwifruit will be gathered, from the planting phase of cultivation to delivery to the consortium. These values will be the subject of an LCA. The obtained value will be compared in the first instance to the amount of kiwifruit per hectare classified as first and second choice, obtaining in this way, the current environmental impact of the unit of product. Considering the results of market and profitability analysis, it will be possible find a new parameter for kiwi waste considering the new value in comparison with the first and second class value and assign a coefficient for waste. The new environmental impact per unit produced will be calculated in this way.

Description

ANALYSIS OF THE EXPLOITATION OF WASTE PROCESSING

From the values obtained from the characterization of residues of processing of the transformation process, it will be possible to derive the BMP (Biochemical Methane Potential) of the new matrix, through the use of some theoretical formulas (Ammon, Kaiser, Baserga, etc.). This value will be converted to BMP corn equivalent. Finally, an analysis of the location and characteristics of the neighboring biogas plants to the production area will be carried out in order to assess the potential market of the processing waste.

Description

IMPACT ASSESSMENT AND PREVISIONAL MODELLING WASTE IN PRODUCTION PHASE

The impact of waste on the total production of kiwifruit is highly variable between different years and among the different

varieties of kiwi.

Through field tests and monitoring of climate trends, the factors prevailing on the incidence of waste will be evaluated. It will allow the development of a forecasting model that predict the amount of production waste in the year in progress. During 2 years, the study will consider the effects of water management, fertilization and pollination.

The tests will be carried out on Ca 'Dell' Antonio S.S., Agricultural Society Morara Domenico and Torsiello Marcella S.S., Tedioli Ivo farms.

The tests consist in the diversification of irrigation in terms of shifts and volumes of parts of the plots, the differentiation of fertilization and pollination practice tests.

Monitoring of the weather conditions will be realized through weather station. Soil analyzes are available in the companies.

The activities will be carried out by Kiwi Gold Consortium Technical service.

From the observations, a forecasting model based on the performance weather, soil analysis and agronomic management in order to predict the amount and type of production waste will be set up.

Description

WASTE CHARACTERIZATION

For each type of waste according to variety, size and shape, some chemical-physical analyzes to evaluate the qualitative and technological characteristics of the waste will be realized, by University of Bologna DISTAL.

The parameters considered will be:

Relationship between part usable and processing residue (conditions the fate of the fruit of lesser value in the transformation process).

Fruit firmness at the time of delivery and during a refrigerated storage of one month (provided the type of snacks that can be produced).

soluble solids content (° Brix) at the time of delivery and during storage.

Nutritional characteristics (dry matter, ash, fiber, protein, fat, sugars and starches)

Quantification of elements with metabolism functional characteristics (vitamins, minerals, fiber component, antioxidant activity)

To this end, the equipment and the materials available in University laboratories consisting of the equipment for direct osmosis it will be used.

These activities will be carried out during the first year of the operational plan.

Description

PROCESSING TEST IN LAB SCALE

In the DISTAL laboratories will be set up production processes trails to achieve kiwi snacks with high functional content.

From preliminary studies carried out by some members of the Operational Group, the types of snacks that would be possible to develop are:

Snack washers: from kiwi waste will be get the washers, which can maintain their nutritional content and color of natural fruit.

Kiwi in pulp: snack to be eat by spoon or drink obtained by the use of extractor or pulper.

Such product can be the object of integration with other pulps of fruits or vegetables to complete the nutritional profile or improve organoleptic characteristics.

Kiwi finger: the realization of a "small" whole kiwi already peeled possibly rebuilt from the pulp, treated in such a way to maintain the nutritional characteristics and color, but that it can be preserved longer.

These activities will be carried out during the first and second year of the operational plan.

Description

SNACK SENSORY ANALYSIS

The nutritional components of a food can not be considered divorced from the general organoleptic characteristics of the product. Sensory analysis, conducted as a panel test, in this case are a critical step to assess whether and how the snack will be appreciated by consumers. The DISTAL has, within its competence, the ability to perform the sensory analysis in specific

laboratories equipped for this activity.

These activities will be implemented during the biennium, at the end of each production cycle as much on what scale laboratory on an industrial scale.

Description

SCALE UP OF PRODUCTION PROCESS AT INDUSTRIAL SCALE

The various techniques developed in lab level will be transferred to industrial scale at the Natura Nuova plant. Such action consist in evaluating the process flow chart and adapt it to existing equipment. Result to be fundamental the directions that will emerge from the laboratory scale tests relating to the temperatures and processing techniques to preserve the characteristics of the fruit.

The fruits, selected for residual brix and consistency for the purposes of the production of various types of snacks, will be initiated in a process which provides a brushing and a mechanical peeling. After these two operations the fruit selected for the snack washers will be cut into disks and sent to a drying system of the liquid fraction at low temperature and in hygienic conditions such that must be sent in its final part a stable product at room temperature.

For the snack mashed, peeled fruit will suffer a passage in an extractor or in a pulper to obtain a pulp. The hygiene and the working temperatures are, once again, the key elements to preserve the qualitative characteristics of the fruit. This puree can be integrated with other fruit or vegetable purees for improve the nutritional and / or organoleptic aspects.

The procedure for obtaining the finger kiwi foresee the use of peeled and processed fruits and consist in the reconstruction of the shape of the fruit from the puree.

Description

ESTIMATION OF POTENTIAL ENERGY OF PROCESSING WASTE

The production processes which will be realized will involve processing waste consisting mainly of peel and connected pulp residues, but also other elements, depending on the snack product.

Such residues can represent significant amounts in the future when the functional recovery will be applied to a major amount of waste fruits. This waste possess organic components that can be further exploited in the anaerobic digestion.

In the second year of the Action Plan, analysis for characterizing such compounds to assess the energy potential is expected .

The characterization analyzes will highlight the contents of dry matter, ash, organic matter and the amount of protein, fat, crude fiber and sugars.

The fiber, in turn, will be characterized in NDF, ADF, ADL, in order to assess the percentages of lignin, cellulose and hemicellulose.

The results of the characterization tests will allow the realization of the analysis of the enhancement of the process residues obtained from the processing

Description

AWARENESS IN SCHOOLS ON THE IMPORTANCE OF HIGH FUNCTIONAL SNACK

An awareness campaign in schools on the importance of a substantial change in the consumption of snacks promotes a healthier way of life, prevents malfunctions of the metabolism and helps to control obesity in younger age groups will be carried out.

The Operating Plan includes 20 meetings to be realized during the two years of activity, during which the Jingold operators will illustrate the benefits of healthy and based on locally produced food eating.

The meetings, to be carried out in collaboration with the teachers of the schools, will be aimed at students from middle and high schools and will address the following issues:

- The kiwi fruit: characteristics, national and local productions, an overview of social and economic character.
 - The content of nutraceuticals in kiwi: differences between the different varieties and comparison with other foods.
 - General information about the function of vitamins, trace elements, fiber and other nutrients contained in kiwi.
 - Characteristics of snacks in general and those obtained with kiwi fruit in particular.
 - Advantages deriving from consumption of this type of snacks in substitution to the traditional packaged products.
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7/7

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The meetings will be supported by information material in electronic and print formats to aid understanding the topics. At the end of each meeting, a short anonymous questionnaire with the participants is foreseen in order to assess the level of understanding of the topics covered and to make any necessary corrective actions.

Description

DISSEMINATION

Results dissemination, in addition to the abstract in Italian and English and the other formalities required by EIP network (European Partnership for Innovation), is articulated through a series of activities aiming at disseminating innovations developed during the 'implementation of the operational plan.

For this purpose, with a view to maximum transparency, the operations conducted and the main results achieved will continually be reported on a dedicated page on the Internet sites of the parties to Operational Group:

www.kiwigold.it

www.jingold.it

www.natura-nuova.com

www.areteonline.net

www.distal.unibo.it

At the end of the project, a summary article of the results achieved will be prepared. The article will be published on the main channels of communication and will have national scope.

At the end of the project, a conference will be realized in which the results achieved, the impact of the same on the kiwifruit industry and possible future developments will be exposed in detail.

The conference will be open to the public and dedicated in particular to agricultural producers interested in kiwi cultivation.

Link utili

Titolo/Descrizione	Url	Tipologia
Sito web del progetto	http://www.naturanuovaspaconsortile.it/2019/03/26/valkisnack-2/	Sito web