



“Best Sustainable Development Practices on Food Security”

**Exclusive European patent for eco-sustainable
"Pesticide-Free" production of frozen vegetables**



July 8th 2015

Project Perimeter

Title:

**Exclusive European patent for eco-sustainable
"Pesticide-Free" production of frozen vegetables**

Partnership:

- Industrie Rolli Alimentari Spa (Leader)
- Università degli Studi di Teramo
- CSQA Certificazioni Srl
- Società Agricola Dedico Srl

Total investment:

~ €30 Mln in more than 15 years

Key aspects:

- ~ **300 farmers** involved every year = **7000 ha/year**;
- + **30 types of vegetables** with specific cultivation rules;
- More than **17.000 analysis/year** collected in a data base with the history of every crop in the last 15 years;
- **Full traceability of each crop** from the seed to finished product

The project at *a glance*

Aim of Project: has been **developing an Eco-sustainable agro-industrial supply chain** for the production of **frozen vegetables with Superior Quality**.

Agronomic: Demonstrated in **an extensive way**, to obtain

- vegetable **products without residues of pesticides or in any case with pesticides level below the experimental detection limit (0.01 ppm)**
- **yields per hectare and costs comparable to those of traditional agricultural products** thanks to improved agricultural practices.

Environmental impact: **significantly reduced** compared to traditional methods also thanks to the **full exploitation of renewable energy for power production** during industrial processing.

THE GLOBAL MAXIMUM RESIDUE LIMITS (MRLS) FOR PESTICIDES: examples



PESTICIDE	DIAZINON	DICOFOL	DIURON	METOLA-CHLOR	METRIBUZIN
<i>VEGETABLE</i>	<i>SPINACH</i>	<i>EGGPLANT</i>	<i>ASPARAGUS</i>	<i>TOMATO</i>	<i>CARROT</i>
<i>Type</i>	<i>Insecticide</i>	<i>Insecticide</i>	<i>Herbicide</i>	<i>Herbicide</i>	<i>Herbicide</i>

MRLS - ROLLI ← Not allowed in Rolli Agricultural System → <0,01 ppm

MRLS - EU	0,01 ppm	0,02 ppm	0,01 ppm	0,5 ppm	0,1 ppm
MRLS - US	0,7 ppm	2 ppm	7 ppm	0,1 ppm	0,3 ppm
MRLS - JAP	0,1 ppm	3 ppm	0,05 ppm	0,1 ppm	0,5 ppm
MRLS - CHINA	0,5 ppm	No limit	No limit	No limit	No limit

Source: SGS whitepaper 10/2014



Key features of the Business eco-sustainable production

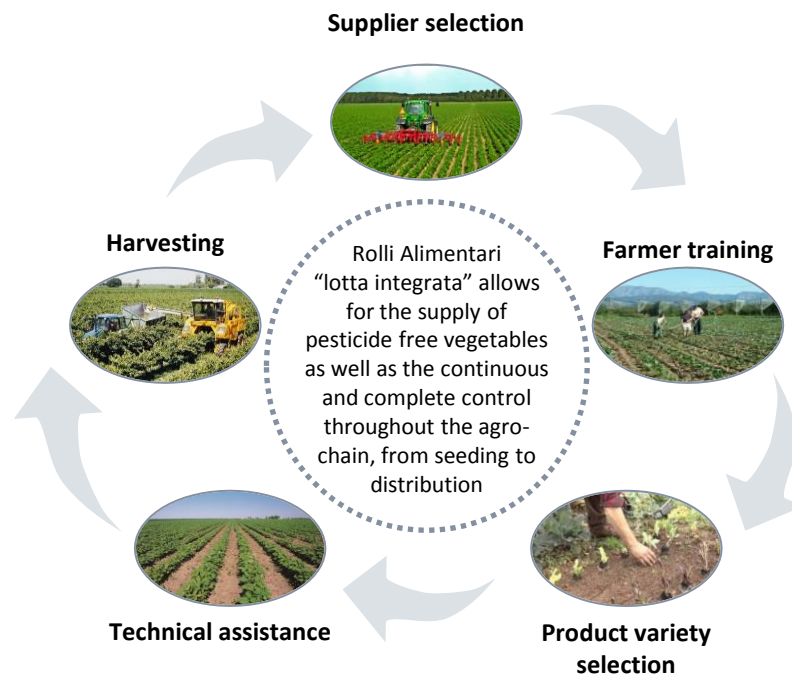
- ✓ **Rolli produces first-class frozen vegetables certified** by international organisations in accordance with the following principles:
 - ❑ **Pesticide-free product** (“lotta integrata”, pesticide-free certification - DTP 021)
 - ❑ **Fully-integrated agriculture system**, allowing for **full traceability** throughout the value chain (controlled agro-chain, value chain traceability certification - DTP 035)
 - ❑ **100% made-in-Italy raw materials and production** (made-in-Italy produce cultivation and processing certification - DTP 061)
 - ❑ **Energy saving company** (energy management systems certification - ISO 50001)

- ✓ In respect of the last point, **Rolli was awarded the energy saving company certification further to its implementation of measures which reduce the environmental footprint of its operations:**
 - ❑ Air - lower CO₂ emissions
 - ❑ Land - cultivation limited to vegetables with low environmental impact
 - ❑ Water - pesticide-free production, allowing for no water pollution during produce cultivation, harvesting and processing



Overview of Rolli Alimentari integrated land management system

- Rolli Alimentari is the only vegetable manufacturer offering certified pesticide free products, leveraging on an integrated agriculture system, “lotta integrata”, and full traceability capabilities certified by the CSQA (international accredited certification institute authorised by the Italian Ministry of Agriculture)



✓ Rolli’s integrated crop management “ECO+PESTICIDES-FREE” system is based on the use of advanced cultivation techniques :

- ❑ **Farmer selection** on the basis of reliability, loyalty and professional certifications .
- ❑ **Farmers training** on the Rolli’s proprietary cultivation ‘Policy Document’ (=disciplinare), developed over decades by its agronomists
- ❑ **Selection of vegetable varieties** certified by the Italian Ministry of Health and **featuring higher yield, adaptability** to local environmental conditions **and natural resistance of plants to pests.**
- ❑ Use of Seeds **GMO-free** directly supplied by Rolli to the farmers
- ❑ **Continuous technical assistance to farmers** on cultivation, pesticides management and water supply activities (before and after sowing)
- ❑ **Selection of pesticide officially registered** with the lowest persistence and **use of treatments only when strictly necessary**
- ❑ **Preventive controls** during the cultivation and harvest periods, as well as on raw produce prior to its arrival at the processing facilities
- ❑ **Harvesting supervision** to ensure the absence of pesticide traces in finished products.

A pioneer in eco-sustainable production of frozen vegetables

Key quality control features



- Each 'ECO+PESTICIDE-FREE' Vegetable is controlled in laboratory **before harvesting** in order to guarantee full compliance with the **total absence of pesticides residues**;
- In a year the internal laboratory carries out about **17,000 analysis** on ECO+PESTICIDES-FREE range (**Pesticides + Heavy Metals + Nitrates**);
- All analysis are carried out thanks to the **Internal Laboratory** equipped with **n. 7 'SOPHISTICATED and MODERN ANALYSIS DEVICES'** for the determination of **at least N. 400 different typologies of Phyto Products** (=active principles);
 - LABORATORY EQUIPMENT :
 - 1 Liquid-Chromatograph equipped with Mass Spectrometer Detector
 - 1 Gas-Chromatograph equipped with Mass Spectrometer Detector
 - 2 Analogic Gas-Chromatographs
 - 1 Atomic Absorption Spectrophotometer for Heavy Metals
 - 1 Spectrophotometer N.I.R.
 - 1 HPLC



Renewable energy as key pillar of eco-sustainability

Biogas plant



- Production and sale of energy to grid, allowing savings on waste disposal
- Innovative exclusive straw bale system, optimising storage, logistics and production process

Co-generation plant



- Ensures energy supply to the Roseto degli Abruzzi plant

Photovoltaic system



- Photovoltaic units installed on the roof of Roseto degli Abruzzi plant

Biogas plant overview

Commencement of operations 2013

Technical profile

Biogas engine power	2,510KW
Electric power production	999KW
Electric power production (p.a.)	8,000MWh
Hot water power production	600KW
Biogas production (daily)	15ts
Corn consumption (p.a.)	17,000ts
Vegetable waste consumption (p.a.)	25,000ts

Co-generation plant overview

Commencement of operations 2010

Technical profile

Natural gas engine power	7,150KW
Natural gas consumption	750mc/h
Electric power production	3,000KW
Electric power production (p.a.)	21,000MWh
Steam power production	1,200KW
Hot water power production	1,450KW

Photovoltaic system overview

Commencement of operations 2012

Technical profile (per unit)

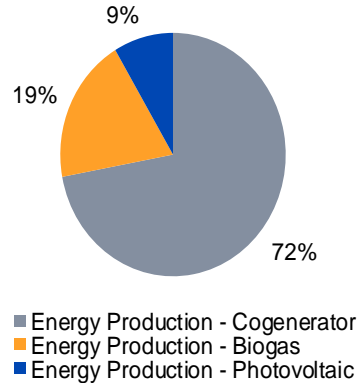
Electric power	999KW (peak)
Electric power production (p.a.)	1,100MWh
Number of panels	3,840

Impact of the eco-sustainable approach in the Roseto plant



Energy management (2014)

2014 energy production: 25,123MWh



Energy management detailed split (2014)

Source	KWh
Energy Production - Cogenerator	18,105,159
Energy Production - Biogas	4,868,128
Energy Production - Photovoltaic	2,150,000
Total Energy Production	25,123,287
Total Energy Consumption	42,265,651

59% energy self production

By product and waste management (2014)

Type of by product / waste stream	% of total weight ¹	Waste cycle
Digested part (from Biogas)	59.1	Back to field (Natural fertilizer)
By-products (peels, raw slivers, vegetables stalks, inedible parts, damaged vegetables)	16.2	Farm food (cattle feed)
By-products (peels, raw slivers, vegetables stalks, inedible parts, damaged vegetables)	16.2	Back to field (Bio-digester)
Paper / Cardboard	3.2	Recycled (into cardboard)
Mixed company waste (actual waste)	2.0	Incinerated
Plastic / PE film	1.8	Recycled (into plastic)
Byproducts with fat matter (water)	0.7	Back to field (Bio-digester after water separation)
Metals	0.5	Recycled (into metals)
Used cooking oil	0.3	Recycled (Biofuel)
● Back to field or recycled (= 98% of waste)		

Note
1 Total weight approximately 20,000 tons

Approximately **98% of waste is recycled** or returned back to field and 59% of electric used is balanced by self-production

Conclusion

It's already possible an extensive agriculture with LMR < 0,01 ppm and yields per hectare comparable to conventional approach;

A low impact agro-industrial transformation is achievable thanks to the exploitation of renewable energy systems (Biogas and Photovoltaic);

This experience represents a real opportunity towards the world need for increasing quantities of food and at the same time improving food quality and food safety as well as reducing the environmental impact.