

September 24, 2025

NEW BIOPRODUCTS FOR TOBACCO FARMING

Michele Falce





Novamont is the global market leader in the very promising sector of bioplastics and biochemicals, active also in agro sector to develop sustainable supply chains for raw materials as well as in waste management to close the loop (circular economy)

- Bioplastics (Mater-Bi): significant market share in Italy, in EU and globally – **main applications are grocery, F&V and waste bags, mulch films, and foodservice packaging** with > 200ktons capacity
- Compostable/renewable polyesters (Origo-Bi): more than 100ktons of capacity to support captive Mater-Bi production
- Renewable biochemicals: first world producer of bio-based butandiol (Bottrighe site) as well as of azelaic and pelargonic acids through the Matrica JV
- Agro: developing improved dry crops and a range of products to regenerate soils and establish partnerships to ensure they are effectively and efficiently adopted (eg Coldiretti)
- Organic waste: thousands of communities supported in the start-up of their separate collection of organic waste in EU, US and rest of world, connections with hundreds of composting/anaerobic digestion plants

Novamont aspires to continue playing a driving and leading role while focusing on/leveraging its established circular bioeconomic model



THE PILLARS OF OUR DEVELOPMENT MODEL

BIOECONOMY AS TERRITORIAL REGENERATION



The Bioeconomy model of Novamont, Benefit Company and certified **B-Corporation**, is based on **three pillars**:



REGENERATION OF DEINDUSTRIALISED SITES

Reindustrialisation of no longer competitive sites thanks to **proprietary technologies first in the world** in order to create **biorefineries** integrated with the territory and interconnected with each other



INTEGRATED AGRICULTURAL VALUE CHAIN AND BIOWASTE REUSE

Development of **low impact value chains** through the valorisation of marginal land not in competition with food production, integrated in local areas and connected with the biorefineries and valorization of biowastes (compost)



PRODUCTS CONCEIVED AS SOLUTIONS

Products and value chains are conceived and designed to provide **unique** and **sustainable solutions** for specific environmental and social problems closely related to **water** and **soil** quality



CONFIDENTIAL



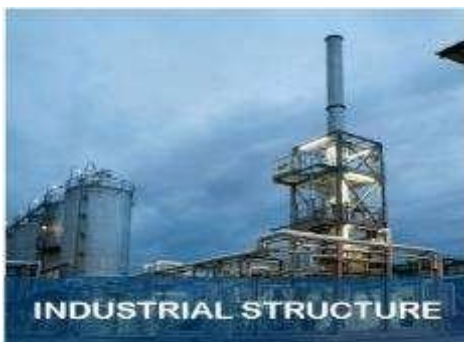
Industrial Structure

Upstream products & downstream applications

- **4 production sites**, 1 in JV (Matrica oxidative cleave plant. Production of Azelaic, Pelargonic Acid and other products) First worldwide
- **10 Mater-Bi** production lines (200KTons capacity)
- **4** discontinuous and **2** continuous polymerization lines for **Origo-Bi** (100KTons capacity)
- **1 BioBDO** fermentation plant (30KTons capacity). First worldwide
- **1 BIOTHF** plant (6KTons capacity)

Distribution

- **1 production site** in Estonia plus 1 dedicated 3rd party manufacturer in US



INDUSTRIAL STRUCTURE

Research & Development

- **2 research centers** plus 1 in JV Matrica; **3 Innovation Hubs** located in the three production sites with pilots and demo plants at different scale
- **About 102 people** (about 20% of total workforce) dedicated to research, development and innovation activities, engineering, application development etc.
- **R&D costs 5% of Core Revenues**
- **5 world-first technologies, sixth and seventh technologies at pilot level**
- **1,400** patents and patent applications
- **Catia Bastioli EU Inventor of the Year 2007**
- **Giulio Natta Award to Catia Bastioli for Chemistry 2015**
- **Cleantech Pioneer Award 2015**



RESEARCH & DEVELOPMENT

Training Center

- **Over 400** training activities since 1996 for young and experts researchers
- Multidisciplinary training paths activated on complex projects
- Partnership with Universities and Research centres at national and international level
- Founding father of the **Italian Cluster Spring** and of **BBI at EU level**
- Founding father of **Biocirce**, the **first European Master in Bioeconomy in the Circular economy**



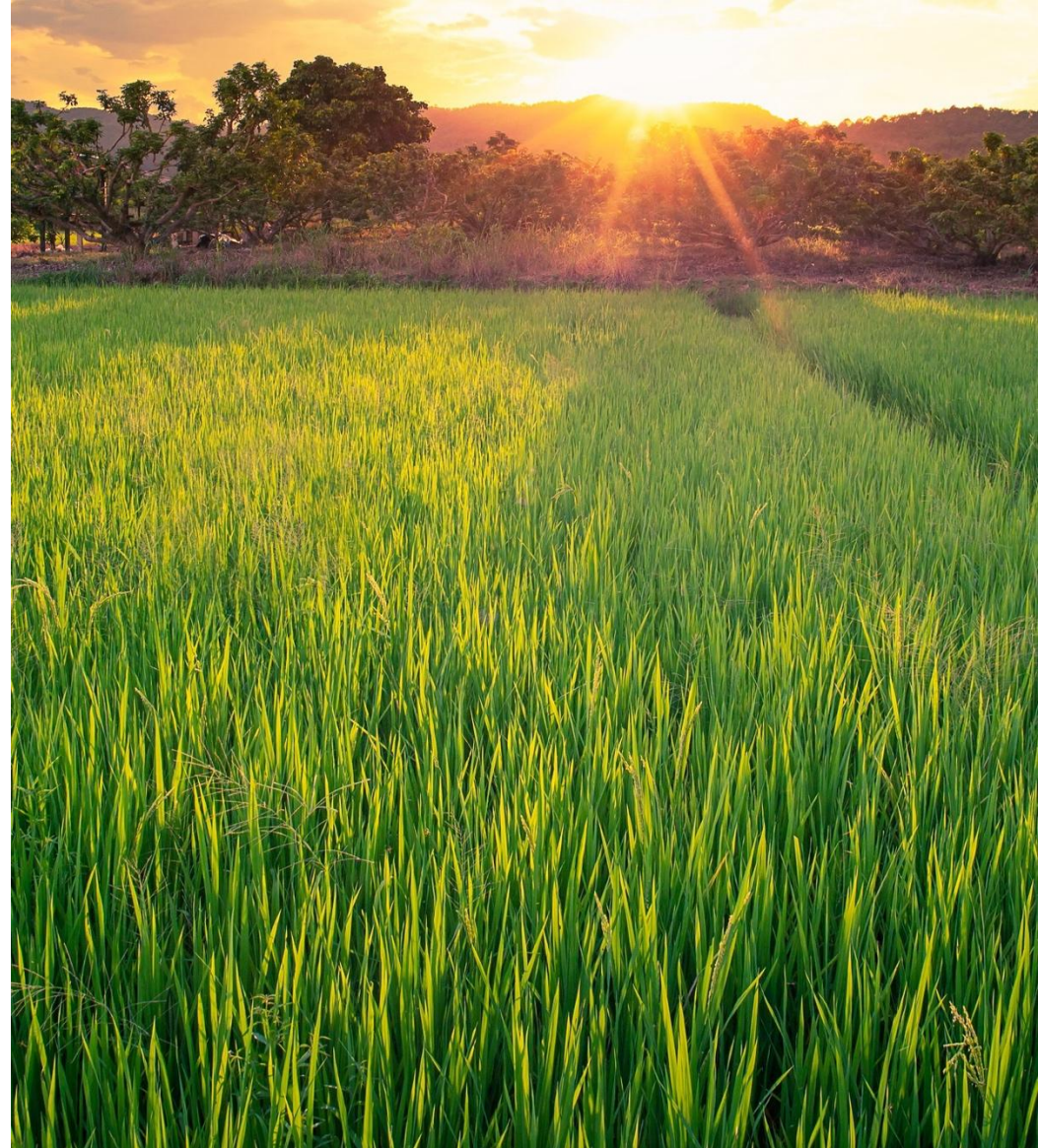
TRAINING CENTER



NATURAL POWER LIFE

Exploiting the POWER of NATURE
to reduce the impact of hazardous substances on the
environment

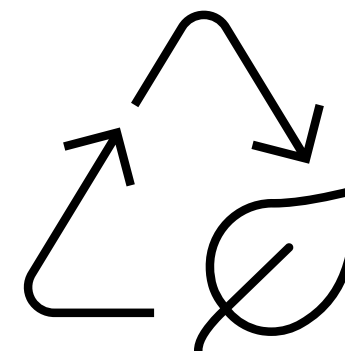
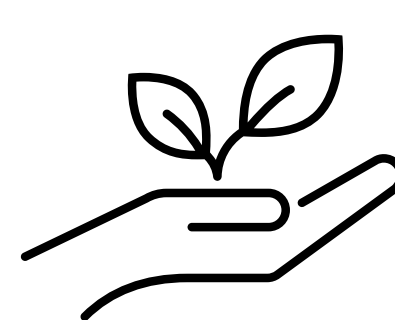
Project n. 101114110
LIFE22-ENV-IT-NATURAL POWER LIFE



**Co-funded by
the European Union**

AGER-BI CONTROL TOBACCO

- Ager-Bi Control Tobacco (DM 18727 of 17/09/2024) is a new plant growth regulator based on pelargonic acid (EC, 718.8 g/l), of natural and biodegradable origin, developed by Novamont.
- **SPECIFIC FOR TOBACCO CROP for THE SELECTIVE CONTROL OF PRIMARY AND SECONDARY AXILLARY SHOOTS WITH STRICTLY CONTACT ACTION MECHANISM.**



Active substance contained	Pelargonic acid (718.8 g/l)
Origin	From high-oleic vegetable oil (sunflower)
Type of formulation	EC – Emulsifiable Concentrate
Colour	Yellow
pH	3,5-4,0
Hazard classification	Irritant for skin / corrosive for eyes (H315/H318) Harmful to aquatic organisms (H412)
Pre-harvest interval	Not relevant (1 day)
Rainfastness	2 hours
LMR	Not applicable

PELARGONIC ACID

The molecule

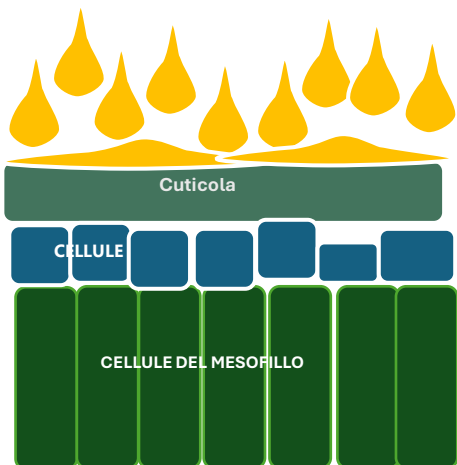
Pelargonic acid (also known as nonanoic acid) is a **fatty acid naturally present** in many pelargonium species (geraniums, e.g. *P. graveolens*, *P. radens*, *P. papilionaceum*).

Additional technical **informations:**

- **Not harmful** for the environment.
- At typical application dosages, it poses **no risks to operators**.
- Not mutagenic, carcinogenic, or bioaccumulative (it biogrades rapidly in soil and water).
- **Non-residual**^[1] : metabolized like other endogenous fatty acids when applied to the plants.
- It has an estimated **soil half-life of 2 days**, so it does not remain as a residue. It is not an endocrine disruptor.
- No issues reported regarding identity, physical/chemical properties, toxicology, ecotoxicology, or technical aspects of pelargonic acid and its representative formulations^[2].

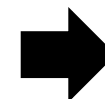
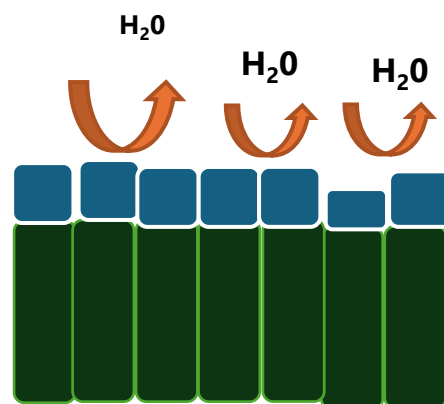
^[1] Pelargonic acid is listed in Annex IV of Regulation (EC) No. 396/2005 [1] as a non-residual substance..

^[2] EFSA: <https://www.efsa.europa.eu/en/efsajournal/pub/6813>



1

Destruction of the outer cuticle:
permeabilization of the cells



3

Rapid dehydration of plant tissue



- ✓ HIGH TEMPERATURES
- ✓ GOOD SOLAR IRRADIATION

Rapid wilting of non-lignified tissues

PELARGONIC ACID: mechanism of action

CONTACT-ACTION PLANT

CHARACTERISTICS: AGER-BI CON
destroying the cuticle and cell wall of

APPLICATION METHODS

- Apply at a concentration of **1–1.2%**
- Treatments may start **before topping** on the stage of shoot development.
- Maximum dose per application: 7.2
- Maximum annual dose: 36 l/ha

AGER-BI CONTROL TOBACCO	
Dose of product (l/ha)	1.0%
	1.2%

- **MUTUAL RECOGNITION** Europe).



ARY SHOOTS IN TOBACCO.

c and non-selective, which acts by
in length) in active growth.

0–600 l/ha.
ing at **7–10 day** intervals, depending

ed to traditional phyto regulators.
even in challenging areas.
ecanol-based products.
r only 3 hours).
nd higher pelargonic content
rcial products.



n, Portugal and France (South

AGER-BI CONTROL TOBACCO - Case studies (Italy)

UMBRIA - VIRGINIA BRIGHT

Location: **Pantalla (PG)**

1st application: 08/08/2021, 2nd application: 17/08/2021

Crop Variety					ITB6118	
Description					Shoots Dead	
Rating Date					23/9/2021	
Rating Unit/Min/Max					% ; 0; 100	
Trt	Treatment		Rate	Appl	33	
No.	Name	Rate	Unit	Code	TA[32]	
1	Royaltac N	3,0	% V/V	AB	56,2	B
2	Royaltac N	3,0	% V/V	AB	71,7	A
	Royal MH	2	% V/V	B		
3	AGER-BI	1,2	% V/V	AB	59,9	B
4	AGER-BI	1,2	% V/V	AB	68,6	A
	Royal MH	2	% V/V	B		

Comparable efficacy of **Ager-Bi** at 1.2% vs. **Royaltac** at 3%



AGER-BI CONTROL TOBACCO - Case studies (Italy)

- New developments: growth regulation tests on **Kentucky** in **Campania** and **Tuscany** in collaboration with **ONT** and **MST**.



In this first year of trials, a protocol was set up to identify an effective dose ensuring no phytotoxicity on leaves.

- For this reason, concentration was kept between a range of 0.7–1%.
- Best results were obtained in Umbria using an electric pump with a hollow-cone nozzle at 1% concentration. This highlights the importance of proper wetting for contact-active products.
- Application at 0.7% ensured control in the first application but with low persistence (shoots regrowth occurs after 3 days).

In the current year, trials are focused on:

- Optimizing distribution technique by increasing water volumes;
- Increasing product dosage (1.5 and 2%) applied locally to extend the persistence (10-14 days);
- Testing strategies with synergy of other actives (Maleic hydrazide);
- Evaluating control effectiveness with 2 treatments.



AGER-BI® - Africa

- In **Mozambique**, Novamont in close cooperation with the **Mozambique Institute of Agricultural Research (IIAM)** and in the framework of a AICS project have been conducted four official trials with the aim of replacing flumetralin active ingredient in 2023 and 2024 agronomic season. In addition, in 2025 were carried out different demo tests in collaboration with MLT (Mozambican Leaf Tobacco) and some local farmers in Angonia region.
- The protocol developed for the Mozambican farmers is based on the application of **Ager-bi® at a concentration rate of 1.0 % and considering a distribution by cap of 8 ml per plant.**
- Results obtained were excellent and the registration process of the formulation is ongoing. In particular, the demo trials showed some advantages in the use of Ager-bi® formulation related to the **speed of action**, in the **safety of the product** which did not cause problems of discomfort after the manual treatment.
- In **Zimbabwe**, Novamont is starting an official trial with the supervision of the **Kutsaga Tobacco Research Board** for the registration of **AGER-BI® in substitution of decanol and flumetralin based products.** The authorization in Zimbabwe, Malawi and Zambia.



NV-ONE ® (South America)

Brazil

- Novamont in close collaboration with Philip Morris carried out several tests in the Northeast Operation in Bahia State Santa Colomba Farm with the formulation NV-ONE ® (Vertie Chemie) at 1.00-1.20%.
- The results showed efficiency in controlling suckers and absence of damages using sprayer bar application method. These demo tests carried out by PMI technicians in 2022 and 2023 wet and dry seasons showed the great efficacy of NV-ONE ® as adjuvant of maleic hydrazide (the recommended dosage for MH is 2.5%).
- In 2024, an official test in collaboration with Santagro was run in the South of the country with the aim of replacing or reducing the use of flumetralin.
- In the trial, the mixture with NV-ONE ® plus a flumetralin based formulation at half dosage showed the best performance also in comparison to the full dosage of the reference.
- The product with the brand NV-ONE® (AGER-BI) is actually distributed on the Brazilian market by Vertie Chemie ® company as adjuvant.



**MATER-BI
BIODEGRADABLE IN SOIL
MULCH FILM ON
TOBACCO**



MULCH FILM ON TOBACCO

- **Mulched crop showed an anticipation of the phenological phase of the plants of about two weeks (the plant were transplanted at the same time on 23th May 2021).** This advantage was also found in the different flowering and topping times of the two theses Mulched thesis: 06/08/2021-Non mulched thesis: 20/08/2021. This effect of mulch film continues also in the timing of the harvesting. For the mulched thesis, the harvesting of the basal leaves took place on 08/26/2021 for the non-mulched thesis it will be carried out on 09/10/2021 September
- **The mulched plants also show an accumulation of dry matter of + 30%.**
- **WEED CONTROL:** Mulched thesis: excellent control of weeds on the using the **Mater-bi mulch film (black type EF04P thickness 0.015 mm).** Thesis not mulched: using of p.a. clomazone (dose of 0.5 l / ha) in post-transplantation phase.
- **WATERING VOLUMES** (from 05/28/2021 to 08/13/2021) **Mulched thesis: 1500 m3 of water Thesis not mulched: 2600 m3 of water**
- **FERTILIZATION** Thesis not mulched: 121 N kg / ha, P 90 kg / ha, 186 K kg / ha Mulched thesis: N 93.8 kg / ha, P 90 kg / ha, 186 K kg / ha-> **reduction in the amount of N (about 30 N units less)**

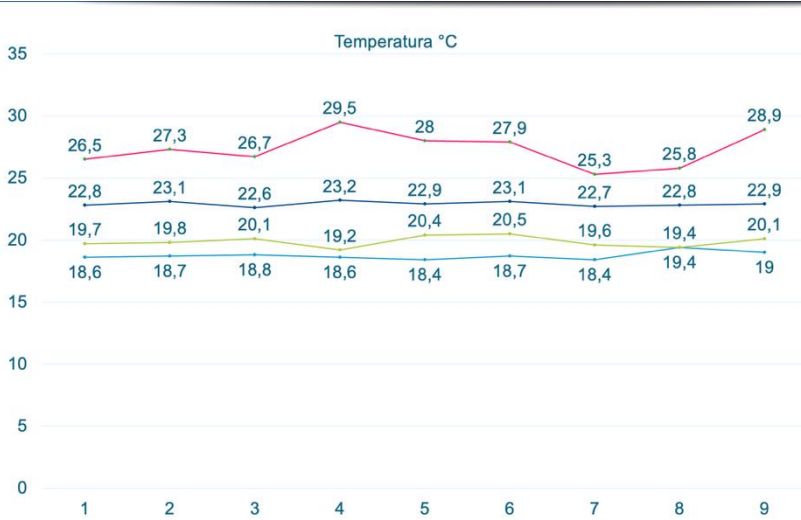
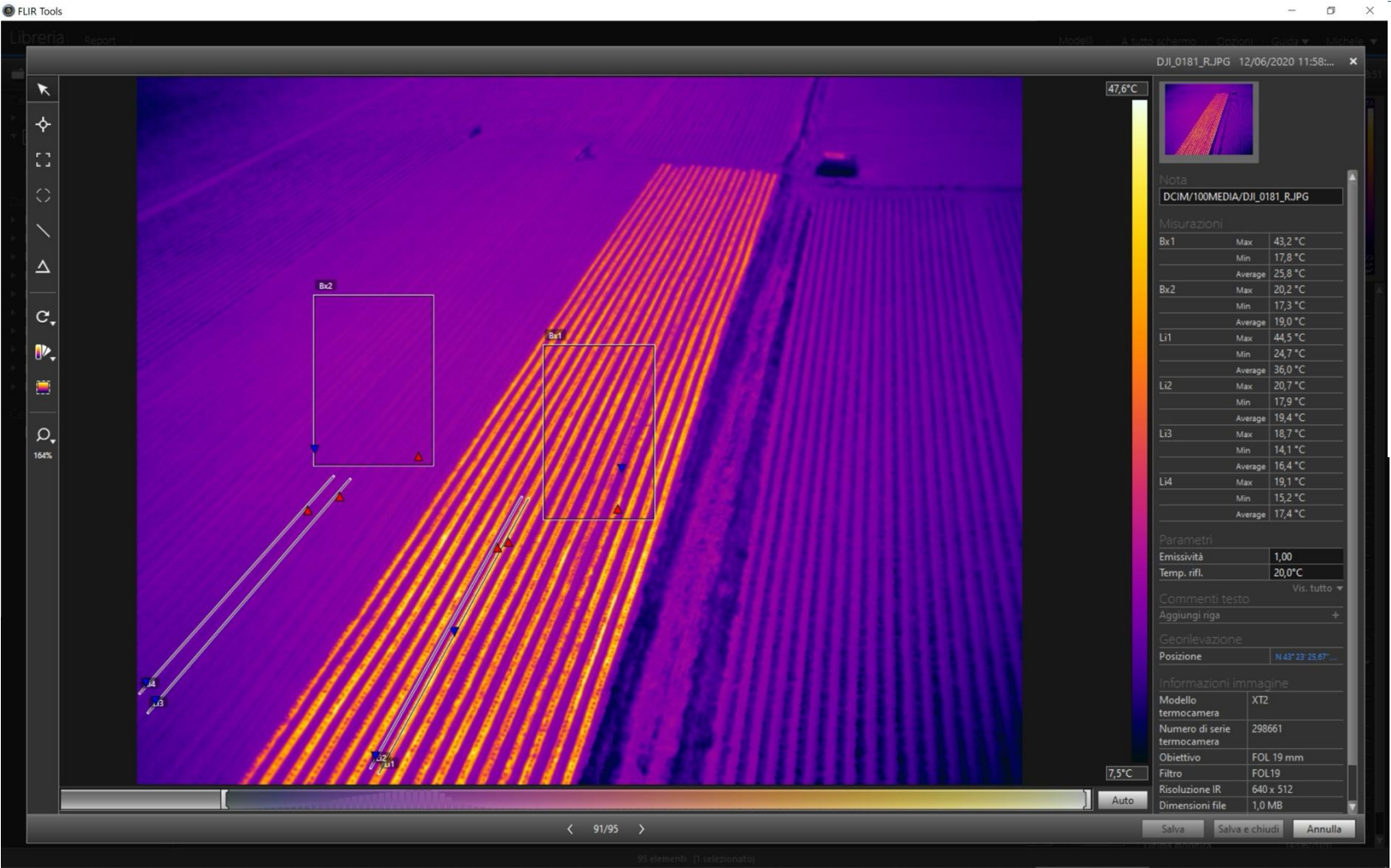






Field Trial – Agricultural Mulching on Virginia Bright Tobacco (Open-Field Cultivation)

Survey conducted using a thermal imaging drone by Michele Falce



- Temperatura superficie suolo nudo
- Temperatura suolo nudo 10 cm profondità
- Temperatura superficie suolo pacciamato
- Temperatura suolo pacciamato 10 cm profondità

Article

Crop Management System Consisting of Biodegradable Mulching Film + Drip Irrigation Increases Yield and Quality of Flue-Cured Tobacco

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Abstract: Mulching is one of the most recommended practices in agriculture due to its positive effects on the plant/soil system. Very few experiments have been conducted to date to investigate the effect of mulching, with both organic and inorganic materials, was to test the synergic effect of a soil-biodegradable (ac film (the commercial Mater-Bi®, Novamont SpA, Novara, with that of bare soil and sprinkler/drip irrigation (first/s on a tobacco crop (*Nicotiana tabacum* L., flue-cured Virgin cultivation district of Central Italy). BS-SD represents t

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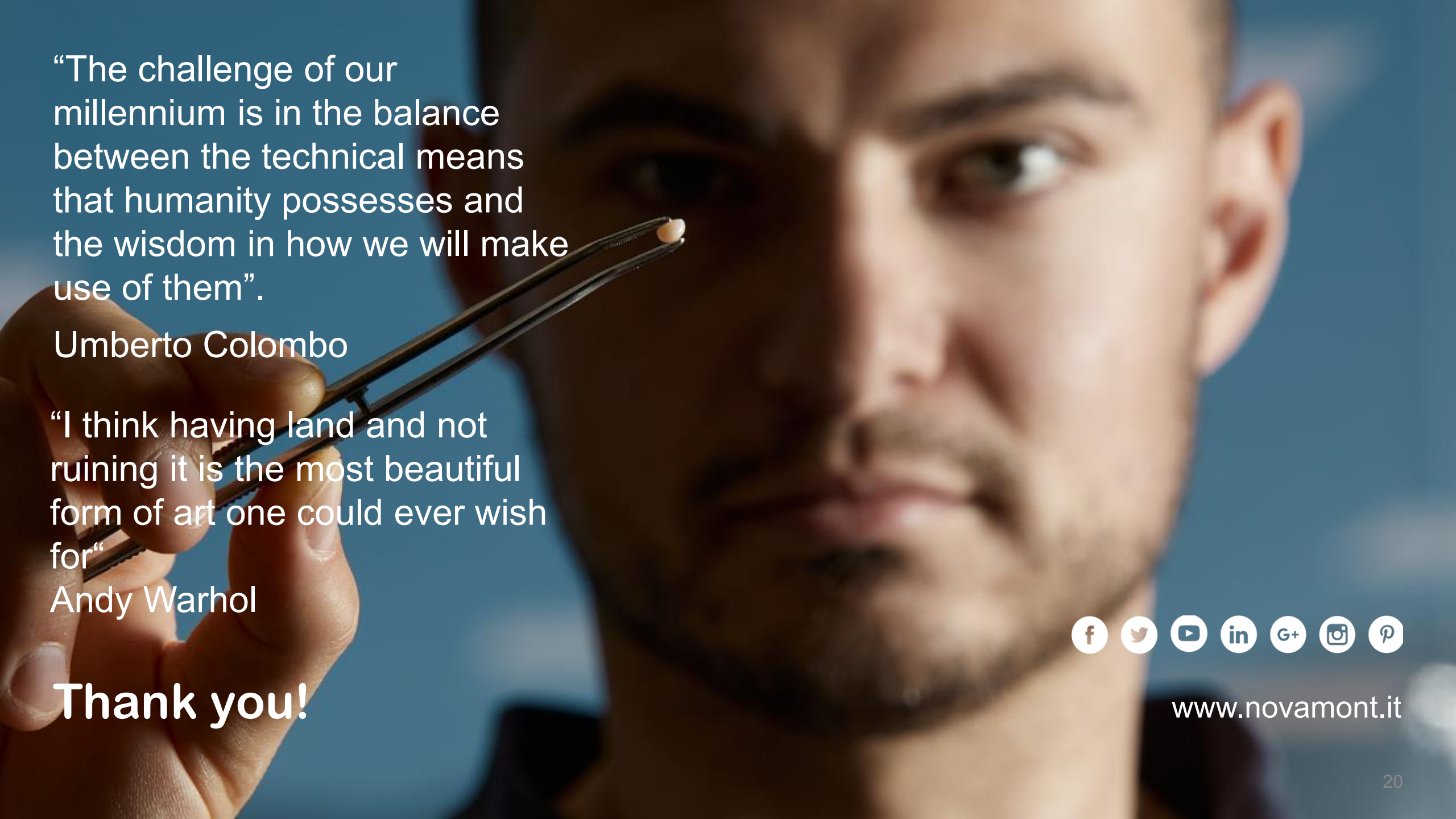
Keywords: alkaloids; gross return; growth rate; *Nicotiana tabacum* L.; reducing sugars; sustainable practices

1. Introduction

Mulching is one of the most recommended practices in agriculture due to its positive effects on the plant/soil system. It is considered a useful tool for crop management within so-called “sustainable development” because it may help to better address the effects of climate change, thus becoming relevant to agriculture in the near future.

Mulching may favor soil water conservation and may reduce both soil and nutrient losses (environmental benefits [1–7]). It can lead to an improvement in the yield and

Parameter	M-D System (Mater-Bi® + Drip Irrigation)	Control (BS-SD)
Average yield	+29%	—
Commercial value	+63%	—
Irrigation volume	1809 m ³ /ha	2812 m ³ /ha
Soil temperature	+1–3 °C	Standard
Reducing sugars (basal leaves)	Up to +150%	—
High-price leaf grades	Higher incidence	Lower incidence
Herbicide use	Reduced	Required
Nitrogen fertilization	Optimized	Higher input
Film certification	EN17033	Not applicable



“The challenge of our millennium is in the balance between the technical means that humanity possesses and the wisdom in how we will make use of them”.

Umberto Colombo

“I think having land and not ruining it is the most beautiful form of art one could ever wish for“

Andy Warhol

Thank you!



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