EU project LIFE13 ENV IT 000461 / "EVERGREEN"

"Environmentally friendly biomolecules from agricultural wastes as substitutes of pesticides for plant diseases control"

TISSELLI VANNI
ASTRA s.r.l.

Imola 13-05-2016

Partner ASTRA

ASTRA Innovazione e Sviluppo (Agency for Technological Research and Innovation in Agriculture and Environment) is a private company with a long term expertise on Agronomic experimentation and demonstration for private sponsors and public institutions.

ASTRA carries out its activities on agricultural production and food chain and particularly on vegetables, fruits, grape, olive, arable crops and seeds production.

CRPV (Centre of Researches for Vegetal Production) is the main shareholder of the company. CRPV represents several Producer Associations and Companies involved in the production and processing of agriculture crops in Emilia-Romagna region.

ASTRA participates to Evergreen project because its objectives are aligned with a low impact defence strategy (the same requests in Emilia-Romagna region) and can be a solution to the problem caused by phatogens that in many cases haven't efficient answers (PSA of Kiwi, nematodes which cause damage on vegetable crops and nursery in sandy soil condition).

ASTRA can facilitate the transfer of the new strategy to the farmer because have daily contacts with the technicians of farmer associations and normally organize during the year a lot of communication and dissemination events.

Action B1 October 2014-March 2015

ASTRA isn't directly involved on the action B1
However ASTRA is a test site engaged on efficacy tests on different active ingredient and strategies against insect, fungi and bacteria.
From some years ago ASTRA has been managing tests on the PSA of Kiwi into a project of Emilia-Romagna region.
Astra has collected data on this tests that can furnish to Evergreen.
The results obviously are referred to the open field test not to a plot artificially inoculated.

Action B2 January 2015-December 2015

ASTRA isn't directly involved on the action B2 because the activities are carried out at laboratory scale and the objectives is to obtain extracts and their fraction that need to be characterized for using it in next months in other actions.

Action B3 January 2015-December 2015

ASTRA isn't directly involved on the action B3 because the activities are carried out at laboratory scale.

Action B4 April 2015-December 2015

Demonstration of the biological activity of the high quality polyphenolic extracts recovered from not edible biomass and waste, against plant pathogenic bacteria and nematode, in planta.

Astra from the beginning of the year started to prepare this action (in the approved project ASTRA was not involved because the activities was been though at laboratory scale).
During this period were maintained contacts with UNIFI and CEBAS to define in detail how to implement the artificial inoculations, what kind of plants will be better to buy, how to isolate the greenhouses, how make the application of polyphenolic extracts.
The technicians visited several nursery to find plant of Kiwi and Olive which had right calibre.
At the ASTRA site of Imola (BO) was prepared a greenhouse that will contain the plants after the treatments.

Action B5 June2015-March 2016

Demonstration of Kilo-scale extraction of the high quality poly-phenolic bioactive molecules recovered from vegetable not edible biomass and waste

ASTRA isn't involved on this action

Action B6 April 2015-March 2016

Demonstration of the null toxicity profile of the high quality poly-phenolic bioactive molecules recovered from vegetable not edible biomass and waste, on model organisms and microorganisms.

ASTRA isn't involved on this action.

Obviously if during next months the responsible of the project and all other colleagues will retain useful for the objectives of the project to make not only "in vitro" tests but also "in vivo" tests on little size plants ASTRA offer its support.

Action B7 June 2015-September 2016

Demonstration of the in vivo performances of the high quality poly-phenolic bioactive preparations, recovered from vegetable not edible biomass and waste, at pilot scale level in field screenings.

This is the main action of testing and transferring new disease control strategy. ASTRA have strictly contacts with farmer association and it's directly involved in updating of Integrated production guidelines. Astra will realise several tests in open field, some of these has been made "in vivo" on little plants because of the minimum quantity of tannins available. Isn't possible to make artificial infection in open field (LIFE project can't be a source of sanitary risks for farmers and environmental), so we are searching plants already sick in different climatic and soil conditions. About nematodes we already have started a test in sandy soil in co-operation with an expert of Regional Plant Health Service to verify the effects of 1 chestnut tannin on nematodes (*meloidogyne incognita*) which cause damages on beet nursery.

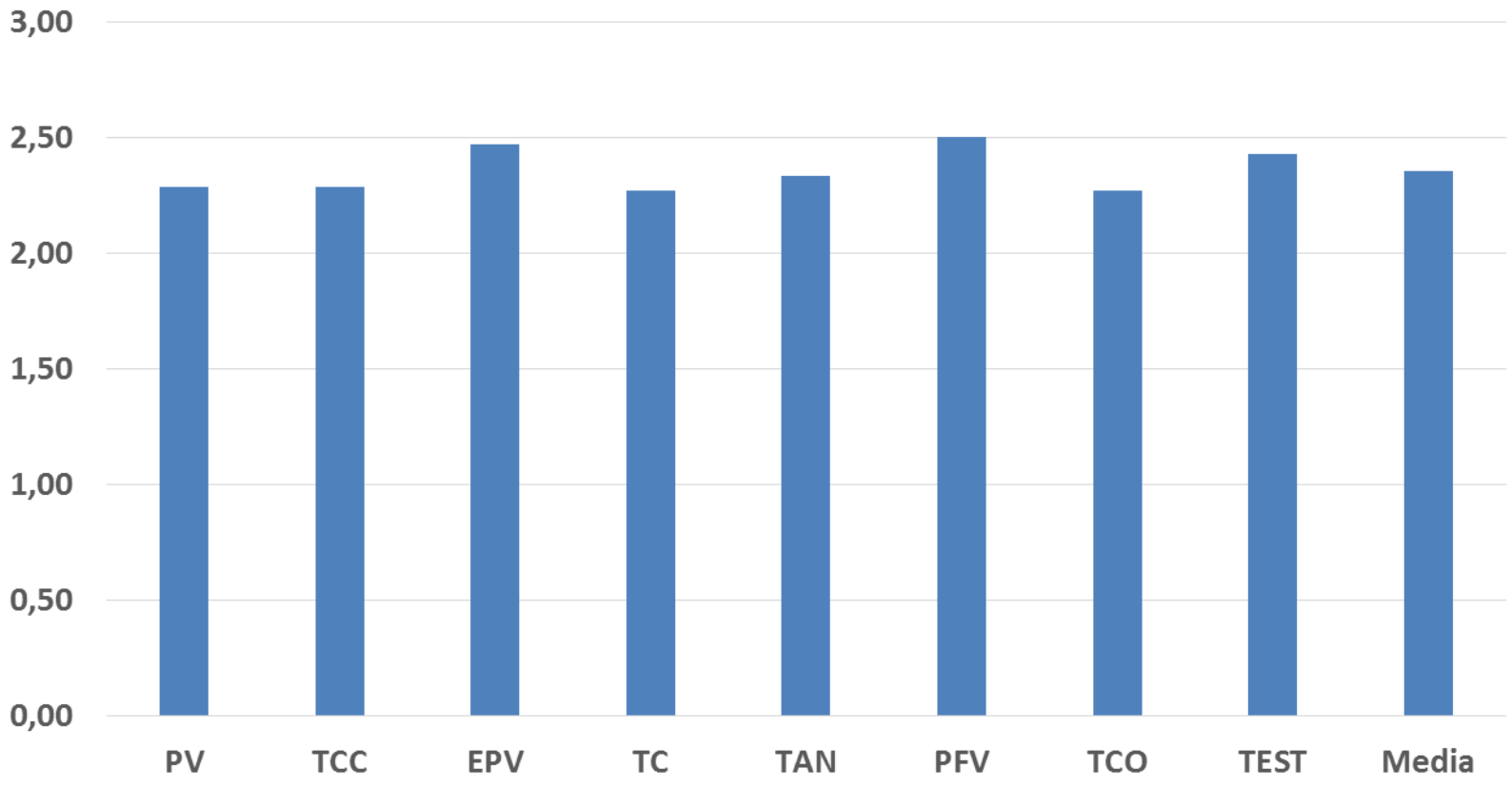
Activities carried out till October.

Test 1. At the end of May potted plants of Kiwi inoculated naturally with PSA was treated with 7 available tannins. Visually symptoms of necrosis can be seen more or less widely on the leaves.

Test 2. During June a test was repeated through the artificial inoculation with PSA of potted plants of Kiwi. After the inoculation the plants were divided in 8 groups of 20 plants.
Seven groups was treated with 7 different tannins, and the last one was considered as Test.

Test 3. During June a test was repeated through the artificial inoculation with PSV of potted plants of Olive. After the inoculation (2 incisions were made for each plant) the plants were divided in 8 groups of 20 plants.
Seven groups was treated with 7 different tannins, and the last one was considered as Test.

TEST 1.Valutazione presenza PSA su foglie di Kiwi
(scala 0-5)




Tcc


TEST.


TC

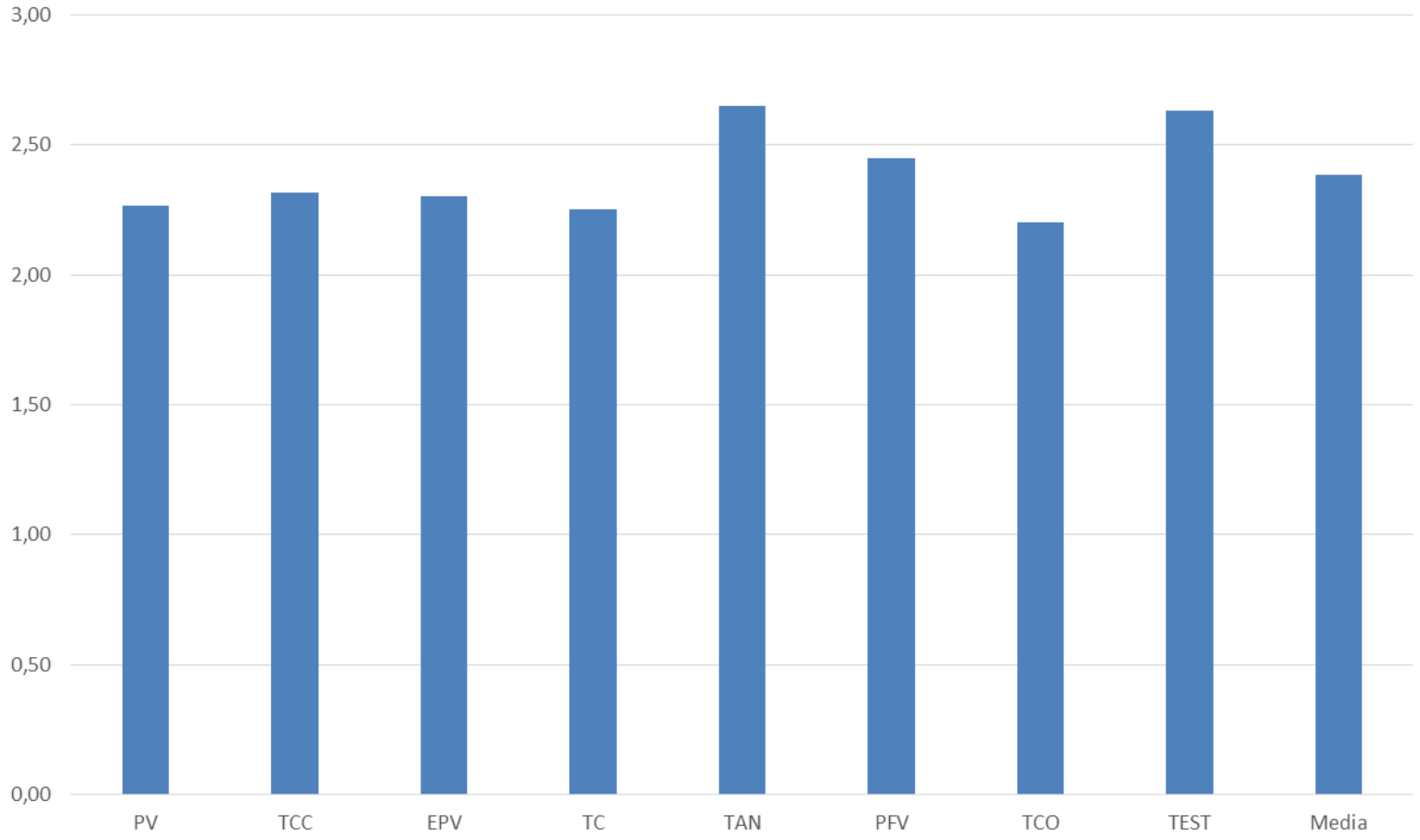

TAN


TCo

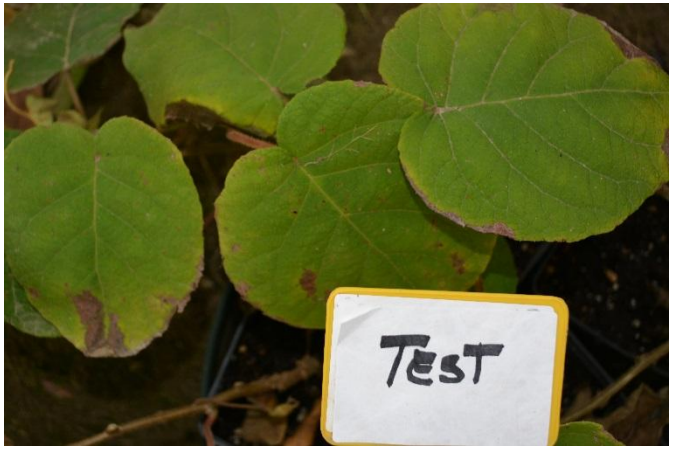

PFV


EPV

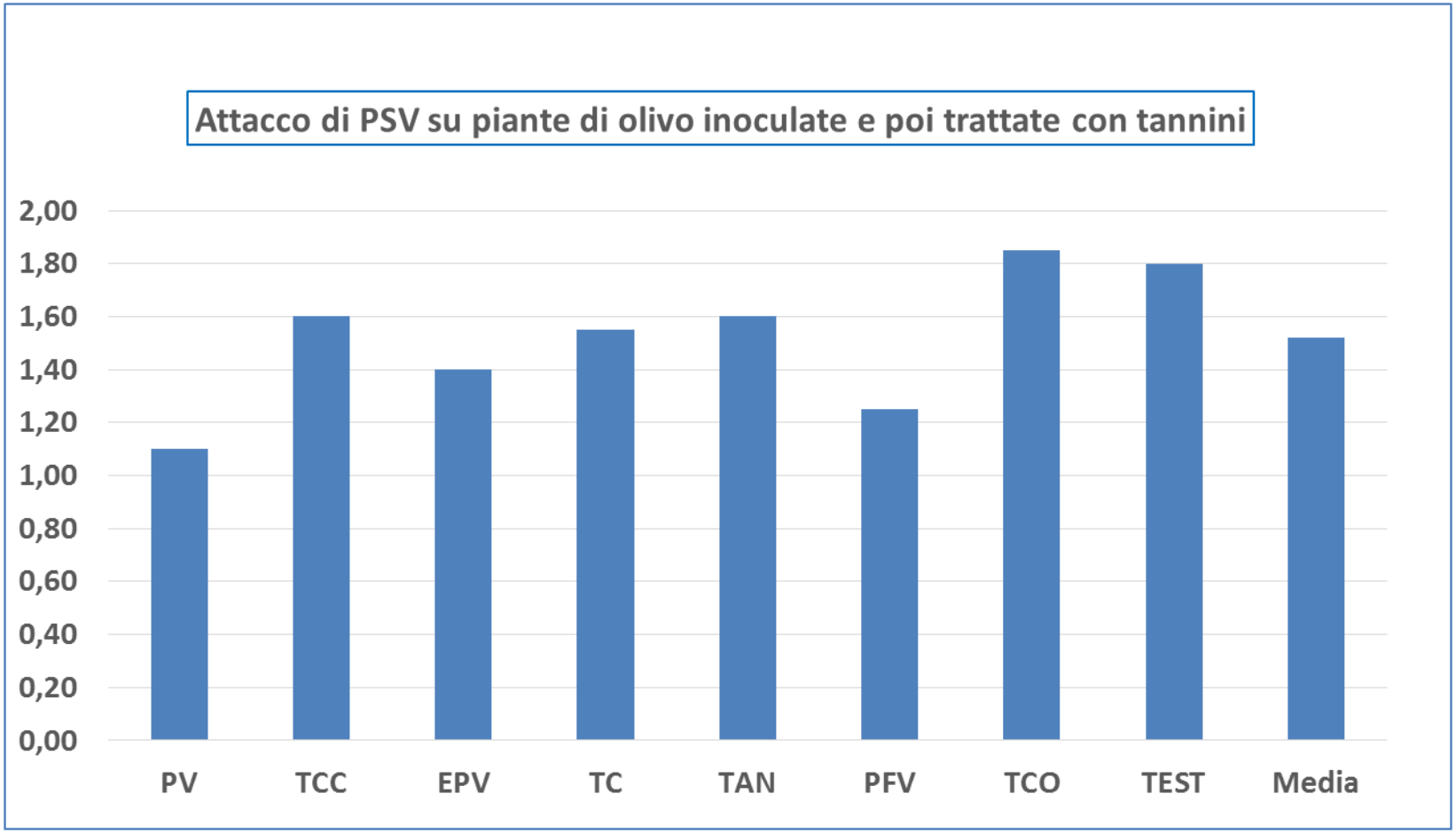
TEST 2.Valutazione presenza PSA su foglie di Kiwi
(scala 0-5)



Activities carried out till October.



Activities carried out till October.



Activities carried out till October.

Activities carried out till October.

Test 4. The experiment was realized on a nursery of sugar beet for seed production.
Normally the cultivation of beet to produce seed is made on heavy soil but the first step of beet nursery is made on sandy soil where nematodes represent the most important parasites.
Till now before beet sowing it was a usual practice the soil disinfestation with 1-3 dichloropropene but now a lot of limits was fixed so it is necessary to find new solutions.
On a surface of 1000 m^2 7 parcel of 85 m^2 was isolated.
At the sowing date the first treatment was made with chestnut tannins. The treatments has been repeated 4 times.
The thesis were:

1) 10kg/ha of powdered tannins
2) 20kg/ha of powdered tannins
3) 30kg/ha of powdered tannins
4) 10kg/ha of microgranular tannins
5) 20kg/ha of microgranular tannins
6) 30kg/ha of microgranular tannins
7) Test

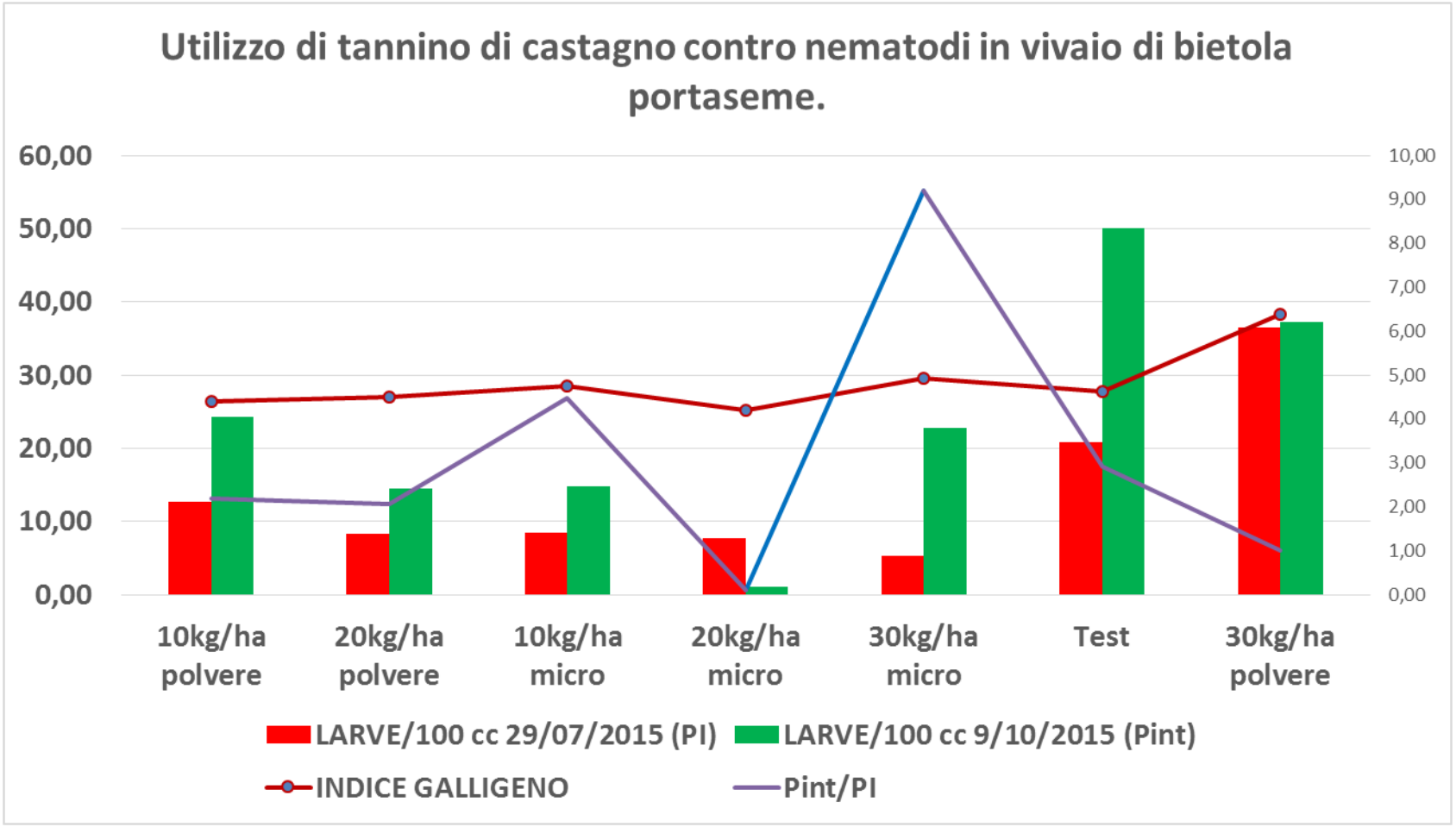
Activities carried out till October.

Activities carried out till October.

Activities carried out till October.

Actions C MONITORING
October 2014-September 2016

	INDICE GALLIGENO	LARVE/100 cc 29/07/2015 (PI)	LARVE/100 cc 9/10/2015 (Pint)	Pint/PI
10kg/ha polvere	4,41	12,75	24,25	2,18
20kg/ha polvere	4,50	8,25	14,50	2,07
10kg/ha micro	4,75	8,50	14,75	4,47
20kg/ha micro	4,19	7,75	1,00	0,11
30kg/ha micro	4,94	5,25	22,75	9,20
Test	4,61	20,75	50,00	2,91
30kg/ha polvere	6,39	36,50	37,25	1,00


Utilizzo di tannino di castagno contro nematodi in vivaio di bietola portaseme.
60,00
50,00
40,00
30,00
20,00
10,00
0,00
10,00
9,00
8,00
7,00
6,00
5,00
4,00
3,00
2,00
1,00
0,00
10kg/ha polvere
20kg/ha polvere
10kg/ha micro
20kg/ha micro
30kg/ha micro
Test
30kg/ha polvere
LARVE/100 cc 29/07/2015 (PI)
LARVE/100 cc 9/10/2015 (Pint)
INDICE GALLIGENO
Pint/PI

Comparison between healthy plants and plants damaged by nematodes

Comparison between healthy plants and plants damaged by nematodes

Activities carried out during 2016

Based on the previous activities, during 2016 experimental test has been repeated with a new protocol defined by CEBAS-CSIC, ASTRA and DISPAA.

ASTRA have started tests on tomato (not included in the project), olive and Kiwi.

On these crops has tested 4 tannins:

1 gel formulation

2 gel formulation

3 liquid formulation

4 liquid formulation

Protocol of the tests 2016

1. Control -: -bacteria – treatment (n=8)

2. Control +: + bacteria –treatment (n=8)

3. Control $CuSO_4$ - : - bacteria +$CuSO_4$ (n=8)

4. $CuSO_4$: +bacteria +$CuSO_4$ (n=8)

5. FORM 1 (liquid): + bacteria +Form 1. Spray (n=16)
   - 5 a. Treatment 24 h before inoculation (n=8)
   - 5 b. Treatment 24 h after inoculación. (n=8)

6. FORM 2 (liquid): +bacteria + Form 2. Spray (n=16)

Test on tomato 2016

Tomato plants was transplanted in greenhouse the…… of March because early the temperature was non right.
The plant developed regularly and the 13th April gel 1, gel 2 and a solution of CuSO4 was put on the soil..
The 19th April tannins liquid formulation(form 1 e 2) was sprayed on 50% the plant of the thesis 5 and 6.
The 20th April bacteria inoculation was made on the plants.
The 21th April tannins liquid formulation (form 1e 2) was sprayed on 50% the plant of the thesis 5 and 6.
The 28th April tannins liquid formulation (form 1e 2) was sprayed on 50% the plant of the thesis 5 and 6.
The 5th May tannins liquid formulation (form 1e 2) was sprayed on 50% the plant of the thesis 5 and 6.

Tomato plants has been inoculated with *pseudomonas tomato* and treated with tannins

Test on Kiwi in green house 2016

The 7th of April 100 cc of solution of Tannins (liquid form 1 and 2) and a solution of CuSO4 was put on the soil..
The 13th April tannins liquid formulation(form 1 e 2) was sprayed on 50% the plant of the thesis 5.
The 14th April bacteria inoculation was made on the plants.
The 15th April tannins liquid formulation (form 1e 2) was sprayed on 50% the plant of the thesis 5.
The 21th April, the 28 April tannins liquid formulation (form 1e 2) was sprayed on the plant of the thesis 5 and 6.
The 29th April tannins liquid formulation (form 1e 2) was sprayed on the plant of the thesis 5 and 6.


3 CvSoh

Test on Kiwi in open field 2016

The 13th of April 100 cc of solution of Tannins (liquid form 1 and 2) and a solution of CuSO4 was put on the soil..
The 21th April tannins liquid formulation(form 1 and 2) was sprayed on 50% the plant of the thesis 5 and 6.
The 22th April plants was put in open field under plants that Had in 2015 symptoms of PSA. A natural inoculation was made on the plants by rain during 23-24 and 25 of April.
The 26th April tannins liquid formulation (form 1e 2) was sprayed on 50% the plant of the thesis 5 and 6.
The 3rd May, tannins liquid formulation (form 1e 2) was sprayed on the plant of the thesis 5 and 6 and the 10th of May the same will be repeated.

FOTO

Test on Olive 2016

The 7th of April 100 cc of gel Tannins (Gel1 and Gel 2) and a solution of CuSO4 was put on the soil..
The 13th April tannins liquid formulation(form 1 e 2) was sprayed on 50% the plant of the thesis 5.
The 14th April bacteria inoculation was made on the plants on which wounds, cuts were done.
The 15th April tannins liquid formulation (form 1e 2) was sprayed on 50% the plant of the thesis 5.
The 21th April, the 28 April tannins liquid formulation (form 1e 2) was sprayed on the plant of the thesis 5 and 6.
The 29th April tannins liquid formulation (form 1e 2) was sprayed on the plant of the thesis 5 and 6.


Arbequina

Next activities

At the beginning of June a test on sowed carrots will start in Ferrara Province where nematodes are a big problem for crops.

Isn’t possible to follow a protocols as CEBAS for tobacco because is necessary to find a field with high nematodes pressure so isn’t possible to have control without nematodes. The control can be a parcel treated with 1-3 dichlorpropen or other nematocides.

Actions C MONITORING
October 2014-September 2016

ACTION C.4: Monitoring of the short term environmental benefits from the use of the high quality standardised polyphenolic preparations in plant disease control at pilot scale level in field screenings.

Astra can furnish only a support in keeping samples for analysis from its test fields, other activities require laboratory equipment and acknowledge.

ACTION C.5: Monitoring of the economic benefits deriving from the recycling of the spent vegetable biomass after the extraction of the high quality standardized polyphenolic molecules at laboratory level.

ASTRA can support this monitoring activities if will be necessary or opportune to work not only at laboratory scale, but a industrial level.

Actions C MONITORING
October 2014-September 2016

ACTION C.8: Monitoring of technical-socio-economic assessment of the Evergreen project

ASTRA will be the beneficiary responsible of implementation this action.

ASTRA will process data from previous in-field demonstration and monitoring actions.

ASTRA will make a collection, elaboration and analysis of the socio-economic impact of the project actions on the local economy and population in terms of employment impact, enhancement of other activities, offsetting social economic.

.

Dissemination Action October 2015-May 2016
D2 NOTICE BOARD

Astra Office in Faenza

Astra Office in Imola

Dissemination action October 2014-September 2016

D5: Diffusion material preparation
D8: Networking,
D11: Dissemination to institutions and policy makers

Astra during winter met Carlo Malavolta (a functionary of Emilia-Romagna region who have an important rule in integrated crops management) and Loredana Antoniacci (a functionary of Servizio Fitosanitario Regionale) to show them the objectives of evergreen project the first results.

Based on evergreen activities new test started in cooperation with dr.ssa Giovanna Curto to control nematodes on pepper with natural substance (commercial tannins, garlic extracts ..)

For the next months Astra will organize:

a. articles for Evergreen dissemination in Emilia-Romagna region
b. 1 meeting for evergreen results dissemination
c. Posters with the result till now showed.

Thank you for your attention

Action E1 Project management
Ottobre 2014-September 2016

Actually ASTRA team in **EVERGREEN** project is the following:

- Scannavini Massimo
- Sgarbi Paola
- Castellari Lorena
- Franceschelli Fabio
- Cavazza Francesco
- Preti Michele
- Lama Martina (only in 2015 now she is on maternity leave)
- Pasotti Paolo (only in 2016)