Annex 4

Part B of the proposal

Proposal full title: An alternative technology for the strawberry crop in a cultural system directed to the biological agriculture used in the temperate climate of Europe .
Proposal acronym: strawberry
Type of funding scheme: Collaborative Project, Small or medium-scale focused research project
Work programme topics addressed:
KBBE-2007-1-2-04: Reducing the need for external inputs in high-value protected horticultural and ornamental crops. Call: FP7-KBBE-2007-1
Name of the coordinating person: Fanica Murariu

List of participants:

Participant no. *	**Participant organisation name**	**Country**
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3	University of Agronomic Sciences and Veterinary Medicine Bucharest	Romania
4	Research Institute for Fruit Growing Maracineni-Pitesti	Romania
5	Research Institute for Soil Science and Agrochemistry Bucharest	Romania
6	Institute of Research in Agrarian Economics and Rural Development Bucharest	Romania

** Please use the same participant numbering as that used in section A2 of the administrative forms*

Proposal

1: Scientific and technical quality, relevant to the topics addressed by the call

1.1 Concept and objectives

The present project aims at achieving an alternative technology for the field strawberry crops involving techniques fit to the biological agriculture.
The initial groundwork of this project includes:
Analysis and evaluation of the technological phases in the present technology of strawberry crop.
Tracing out the technological phases, great consumers of external inputs.
Evaluation of the potential risks causing major perturbations if the external inputs wouldn't be used.
The technological phases specific to soil and plant protection are great consumers of resources coming from the external inputs influencing largely the final product. Therefore, these technological phases will be modified into a large extent.
Tracing out the types of external inputs, which enhance CO_2 emission or other glasshouse effect substances (ex. Methyl bromide) and proposing other alternatives.

The alternatives have been previously studied within R & D projects backed by national funds following to be fulfilled and applied practically as an integrated technology in the present project.

Objectives

1. Diseases, pests, weed biological control by soil – soil balance (soil vertical line balance) and soil – plant balance (soil horizontal line balance).

2. Adsorbtion on the active coal and decomposition of pesticide residues in soil.

3. Optimization of external inputs in terms of nutrients, water, energy and protection materials (replacing the plastic sheet with biodegradable vegetal film).

4. Ratio between CO_2 amount given out calculated according to external inputs and CO_2 amount absorbed by the strawberry crops.

5. Implementation of the alternative technology for the strawberry culture by: experimental fields, technical and technical-economical instruction submitted to the farmers to access to bank loans**,** subventions or non-reimbursable loans**.**

1. Disease, pests and weed biological control by soil-soil balance (soil vertical line balance) and soil – plant balance (soil horizontal line balance).

Alternative solution proposed, scientific – technical reasons backing the proposed solution, its comparison to the present state.
Before the establishment of strawberry plantings, the soil should be biologically prepared.
The time for soil preparation is related to its initial condition and level of present unbalance to be repaired.
According to the soil contamination level of pesticide residues, active coal amounts per ha should be applied: hundred of kilograms up to one ton (see objective 2).
The soil will be mechanically ploughed at the surface layer level (0 – 0,1 m) without clods overthrowing or deep ploughing.
The wild soils not mechanically ploughed include a range of microorganisms well noticed on each soil-vertical level.
In this type of soils one can see an ecological balance between the pathogenic microflora on one hand and saprophytic, mycorrhizal microflora on the other hand.
This balance is maintained by a self-adjustment complex biological mechanism, not known enough.
For the soil in the horticultural high density plantings there are not reported the self-adjustment biological mechanisms.
The ratio between benefic and pathogenic microflora is chemically controlled and its lack or effects, makes the ratio quoted alleatory.
The self adjustment biological mechanisms were removed by using the pesticides and soil disinfection chemicals (ex. Methyl bromide which kills any living form in the soil, when applied).
One can see serious unbalances in soil ecosystem in case of high density systems and we can ascertain that from the biological standpoint, the soil is lifeless.
We ask ourselves if there is possible to have a self/adjustment biological mechanism (similarly to that presently in wild soil) in the soil with horticultural crops when using high density systems.
It may be a positive answer if the agricultural technologies involved will meet the environmental conditions of wild soils or at least closed to them.
The processes taking place in the complex biological mechanisms of the natural soils can not be entirely known and scientifically fundamented but nevertheless they may be stimulated and take advantage of their effects. In other words, we do not know the cause but providing the fit conditions for these phenomena we can generate their effects and have a benefit.
Quantifying the effects we can ascertain the cause.
During 1995/2002 and 2002/2007 within the R-D project developed by Biophan, the manager of the present project performed measurements and analyses on wild soils and on soils with commercial agriculture.
After 1990, in Romania, large acreages where previously intensive technologies had been applied were abandoned. The utilization of heavy amounts of pesticides and chemicals led to severe ecological unbalances leaving the soil lifeless from the biological point of view.
It was believed that the follow lands might be a solution for the ecological soil recover. But presently (2007) this strategy is invalidated by the soil analyses:
The fallow lands left without disease, pests, weed biological control suffered severe and not mild ecological unbalances as it was thought.
So, the pathogenic microflora developed exponentially dominating the ecosystem (being more resistant into a lifeless environment and without antagonic competition and without application of control chemicals).
Great seed amounts of “key” weeds were accumulated to the soil surface and at the time of deep ploughing of soil they reached the deeper layer where the preservation capacity is much higher.

On the occasion of soil mechanical ploughing, the weed seeds are brought in the surface layer. The weeds emerged must be controlled by applying great amounts of herbicides.
The solution proposed in this project is a general one, practically applied in the technology of strawberry crop.
We sugest a biological recover of soil by an active rest period involving the biological control of disease, pests and weeds.
In the first phase, we should remove the stock of weed seeds in the superior soil layer and produce unwashable organic fertilizer.
By the superficial soil ploughing with a horizontal device the surface layer is loosened.
In this case, a certain air amount penetrates the soil and stimulates the germination of weed seeds.
As the literature reported [1], O_2 and N_2 amounts stimulate the germination of weeds seeds by 28% versus the control.
If to that, a constant amount of water and inorganic N is added, the optimum germination can be reached.
After the weed germination, small rates of chemicals and water are applied until blooming time.
Therefore, the inorganic mineral compounds are changed by the weeds in organic compounds, the N from the chemical fertilizer being changed into proteic nitrogen.
The weeds are mechanically cut and incorporated obtaining thus an unwashable organic fertilizer.
The incorporating of cut weeds in soil is done also with horizontal device, starting a new cycle which favor the weeds germination and undoubtly a production of unwashable organic fertilizer obtained from chemical fertilizer.
The disease and pests biological control which has the spreading vector by soil is performed by a pesticide. The proposed biopesticide has a clear destination.
Its utilization in the biological control of fungal pathogens in soil covered by strawberry crops or biological control of soil pests.
In this case, the biopesticide will be incorporated in soil and it will have a stopping or killing action of the fungal pathogens: Botrytis cinerea, Phytophthora infestans, Fusarium oxysporum f.sp. lycopersici, Sclerotinia sclerotiorum, Alternaria solani, Verticilium dahliae, Rhizoctonia.
For this utilization, the biopesticide will contain Penicillium sp. strain actively antagonic to the fungi and vegetal extracts obtained from Tagetes patula flowers.
Worldwide and our country as well, there is a general trend for using into a greater extent the biological products based on microorganisms and vegetal extracts in the control of strawberry pathogens: Botrytis cinerea, Phytophtora cactorum and Sphaerotheca macularis.
So, presently there are on the market some biofungicides based on Trichoderma harzianum T39, Pythium oligandrum, Reynoutria sachalinensis used in controlling the strawberry pathogens: Botrytis cinerea, Phytophtora cactorum and Sphaerotheca macularis.
Some of those biofungicides were tried under our domestic conditions and registered to be used in Botrytis cinerea control on strawberry.
The progress and practical results, obtained in the fungi control following the lab and field tests, are encouraging and determined us to develop investigations within this project.
As it is known, Botrytis cinerea fungus has an epidermic character in the rainy years, causing great economic losses or even total loss of the strawberry yield.
The topics proposed in this project are by far more important having in view the interest of the farmers towards this species because its fruits are both adequate to the fresh market and processing as well, being highly demanded to export.
A study was made by Biophan Co. in case of implementation of the method which use the Penicillium strains as agent of biological control in the field crops; this topic addressed is quite a novelty. We can mention the significant results recorded within PNCDI projects:
- 2467 AGRAL “Biological technology for the medicinal plant protection” using plant extracts obtained from green row material (antifungical) in synergy with the active germs of a Penicillium strain (incompletely characterized to be classified) on starch support for the biological control of fungal diseases in artichoke crops (Cynara scolymus) caused by:

Alternaria solani, Leveilula taurica, Sclerotinia sclerotiorum, and S. fukeliana, Corticium solani, Verticillium dahliae.
-4507 BIOTECH "Biological products with vegetal active principles for phytosanitary use", a project implementing and registering the technology of extraction and concentration of the extracts from the green plants with antifungal qualities. A preliminary study on the exponential growth of a Penicillium strain vegetal support from green plants was carried out on the pilot plant.
Among the priorities of the present objective is the development of a biopesticide with high effects in disease and pests control.
The biopesticide was investigated within 4507-Biotech – PNCDI – C4 project (2004) and then in CEEX 59-2006 project (2006) financed by governmental and private funds.
Presently, it is under trial at the pilot unit.
The pilot unit has two distinct equipments: Alfa Laval: Extraction, concentration by criogeny in CO_2 atmosphere and growth of Penicillium sp. growth plant (250 l, digital system for parameters control: pH, temperature, rH, pressure, carbonic acid concentration, etc. and auxiliary equipment of fractioned separation in CO_2 inert medium.

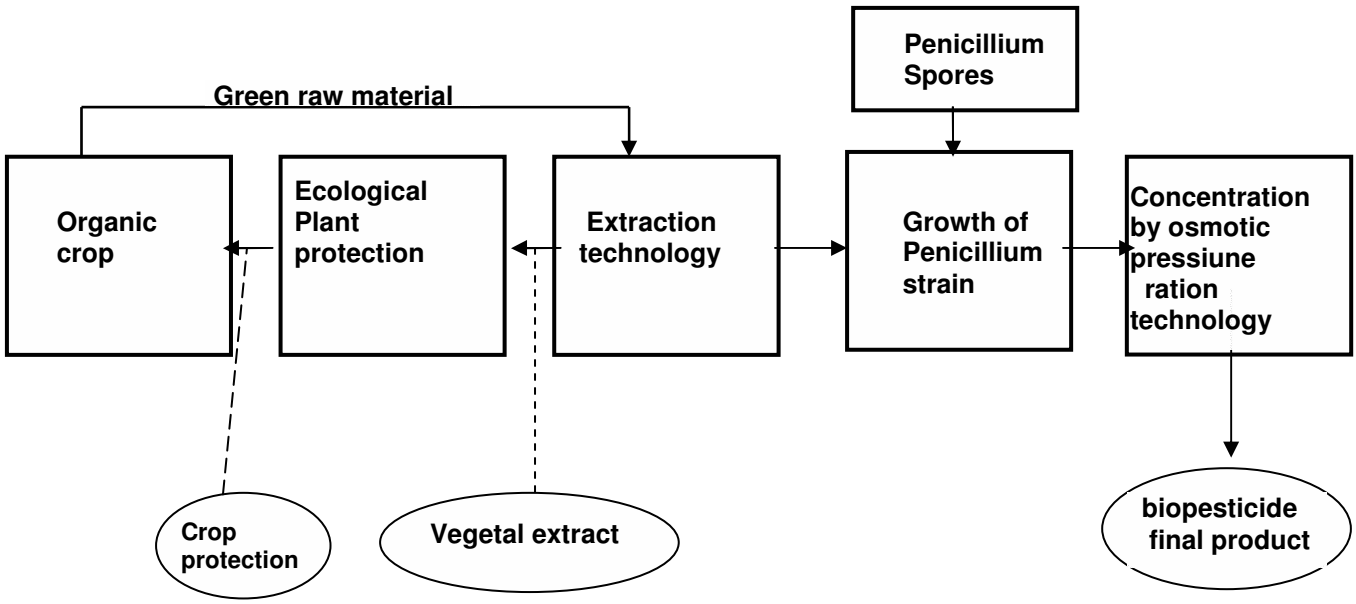

Fig. 1 Technological cycle to produce the biopesticide in the pilot plant: Biophan natura naturans.

Utilization of Penicillium sp. strains in the biological control is more recently in the European research [2].
The effects induced to soil following the biopesticide utilization are closely related to the glucides content in soil. The application of this biopesticides brings about the development of Penicillium sp. strains and modification of ratio between, the pathogenic microorganisms and benefic microorganisms for glucides source; the development of fungal pathogens in soil is given by the rooting exudates from various plant species. So, it is very important the inulin amount resulted from the decomposition of some plant rhizomes.
The use of inulin as source, of carbohydrates needs the presence of some enzymes with β-fruitfuranosidasis enzyme in fungi.
The inulin hydrolysis is by far the most intensely in case of Penicillium sp. (Nakamura et al., 1997) followed by: Aspergillus species (Vandamme and Derycke, 1993; Nakamura et al., 1994; Ettalibi and Barotti, 1987); Fusarium oxysporum (Kaur et al., 1992); Kluyvermyces marxianus (Guerrero et al., 1995), Kluyvermycea fragilis and Debaryomyces cantarelli (Barthomeuf et al., 1991), Candida kefyr (Negoro and Kito, 1973), and bacteria: Bacillus

circulans (Kushibe et al., 1995), Clostridium acetobutylicum (Efstahion et al., 1986), Pseudomonas sp. (Kim et al., 1997).
The plant roots eliminate by exudation a wide range of organic substances (over 10-40%at plant photosynthesis) elements and the reaching the soil contain aminoacids, organic acids, carbohydrates, phenols, vitamins, enzymes, purines, anorganic ions) which can influence and give energy to some active groups in rhizosphere.
These exudates, by their composition influence the soil physical, chemical and biological properties being important in plant nutrition. The chemical compounds with allelopathic potential (Roshchina, 1999, Narwal, 1999, Rimando, 2001) can control the various soil pathogens as natural biopesticides. Generally, the saprophites and biotrophes (mycchorizal fungi) develop in rhizosphere as a result of a loss but also plant pathogens can infest a susceptible host causing diseases.
The studies have shown that the effects of plant exudates occur as stimulation/inhibition processes of saprophytic microflora, as a result of the ratio between saprophytic/parasitic microflora (Danuta Pieta, 2001, 2003) of some specific simbionts (diasotrophes, myccorhiya) of antagonic relationships between pathogens and roots of phaune (Curl, E.A., 1982; van Egeraat, A.W.S.M., 1972) as well as nutrients availability.
Microbial interactions in rhizosphere may be involved in the biological control of bacteria (bacteria – bacteria, Johnson and DiLeone, 1999, Penalner and Lopez, 1999) and fungi (bacteria – fungi, Wager et al, 1995, Marilley and Aragno, 1999) using the of fungi as control agents of protozores, bacteria and fungul phitopathogens.
For each interaction type, there are made analyses for antibiosis, competition, parasitism and resistance induction (Larkin, R.P., 1998, Fravel, 1999, Whipps, M.J. 2000, Whipps and Lumsden, 2001).
The effects of various allopathic compounds (plant parts, rooting exudates, sap, microbiological activity) were studied both in terms of relationships between various plant species roots and also of nitrification processes, biological fixing of molecular N and P biological mobilization (Kohli, 1998, Mizutani, 1999, Smith, 2003).
The studies proved that the rhizosphere is strongly influenced by the inner stress of the environment including the diseases, insects, extreme temperatures, humidity, the various content of nutrients, radiation, herbicides, soil type and cultivar (Haynes, 1997, Hertenberger, 2002).
The various applications (foliar fertilization, growth regulators) are also included in the factors altering the microbial composition of rhizosphere (Putnam, 1984, Barnes, 1987, Williamson, 1990).
It was studied the direct influence of exudates in rhizosphere on the antimicrobial processes (Bais, 2004), on biofilms done by pathogens by means of AHLs autoinductors (Fray, 2002, Walker, 2003), of symbiosis (Dakora, 2003), adaptation capacity (Kneer, 1999, Nicol, 2003), as well as the indirect influence on the bacterial biocontrol (Ryan and Kinkel, 1997) or fungal biocontrol (Dakora, 2003).
Also studies regarding the major plant and microorganisms effects on the processes in rhizosphere (Kourtev, 2003, Soderberg, 2004) as well mutual influences (Kang and Mills, 2004) were employed.

2. Adsorbtion on the active coal and decomposition of pesticide residues in soil.

It has been in view to analyze the adsorption of soil pesticide residues on active coal and desorption under the present environmental conditions of agricultural crops. The active coal is a good catalyser of many chemical and biochemical reactions playing a benefic role in descomposition of pesticide residues in soil, of organic substances resulting from the plant remauning incorporated in soil as well as in soil–plant interaction.
Application of the active coal in soil is a method which can enhance the organic elements by the changes caused in the decomposition processes of organic matter which increase the light fraction of the organic carbon. Other advantages of the biological agriculture are: a greater

amount of organic matter, larger contact areas with microorganisms, increase of physical protection by developing the complex organominerals. There will be observed the effects induced by the coal addition in soil on the microbial processes. As it is known, the active coal stimulates the colonization of crops with indigenous mycchorizal fungi. Also, its application may improve the development and weight of nodosities (2, 3 times) as well as the fixing efficacy of molecular N (2,8 – 4 times). The active coal can bear a small microbial population which is more active than that in humus, (Pietikainen, 2000) it's micropores being a protection structure against the predators.
The present project includes the study of the improvement of bacterial rate and basal respiration level following the application of the active coal. It has the ability of adsorbing organic compounds inhibiting the plants growth and can form a new biotope for the microflora which decompose the adsorbed compounds. The soil microorganisms change and recycle the organic matter and plant nutrients and they may be a reservoir (during imobilization) and a source (during mineralization) of movable nutrients.
The microbial biomass and respiration will be utilized in evaluation of microorganisms performance for N supplements or increase of organic compounds benefic to the plants as well as for assessment of inhibition level of toxic substances.
When the active coal is utilized in agriculture, this is greatly influenced by the temperature and environmental changes. The environment and weather factors such as: changing humidity in soil, day– night temperature variation, multi-monthly and yearly variation influence the adsorption and desorption processes in longer cycles (tens or hundreds of days). In soil there is a continous variation of water amount and consequently there will be a continous exchange between the active coal and soil.
In the active coal site, soil and water substances are accumulated (all chemical and biochemical reactions take place in a variable watery medium as the: water-organic substances ratio standpoint.
Due to temperature and humidity fluctuations, to water exchange and osmotic pressure, it takes place the desorption of the organic substances in situ and its reactivation. Since the adsorption and site saturation with coal until the desorption, there is a long time when the biological and chemical decomposition processes take place.
In germination and glasshouse tests we shall observe the ambiental conditions (temperature, humidity) and make them close to the field ones; the active coal will be used as powder or put on the support plates. In the experimental plots it will be generally used as powder and only in the special treatament we shall use it on a support plate (some m^2 area).

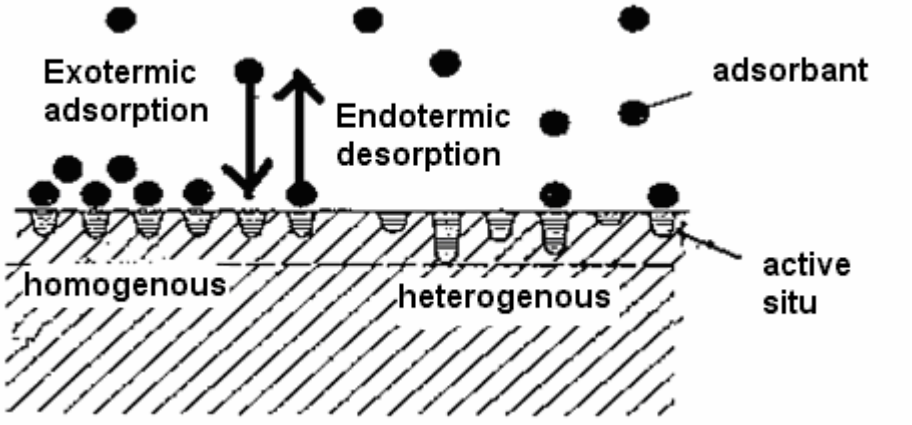

Fig. 2. Adsorption and desorption at the active coal level

The utilization of active coal in soil decontamination of remanent organic pesticides is internationally certified and do not need research work.

No matter the technology used to produce active coal is a high energy consumation. The black coal is obtained at 350^0C and its activation is done in N_2 or CO_2 inert medium at about 850^0C. To reduce the energy consumption, to improve the balance of given out CO_2 / CO_2 fixed in soil and to raise the decomposition, it is suggested.
The vegetal remainings from the agricultural crops will be transformed in black coal by their processing in a horizontal oven with auto combustion air adjustment device to maintain a temperature of 350^0C.
The active surface, of the black coal is more inferior than thatn of the active coal.
If we take into account only the active surface, then the use of black coal in soil decontamination of pesticides may be uneficient.
Biophan had a control sample with soil treated with active coal and one sample treated with black coal got from vegetal remanings (the black coal was used right after processing) and one could see that the test sample was superior to control one.
The analysis of free radicals for the two samples (analysis by spin electronic resonance) showed that the active coal imported from German (Donan Carbon, sortiment Hydraffin 30N) RES spectrums did not confirm the presence of free radicals; for the black coal, RES spectrums confirmed the free radicals of long life.
The free radicals are extremely reactive.
From this point of view, the free radicals are divided in two groups: some with an extreme reactivity and coensequenthy with a very short life, others, although very reactive are however more stable and of course with a longer life.
The C free radicals become very stable and the impar electrone can be conjugated with π electrons from neighbour aromatic groups.
The vegetal remainings contain aromatic heterocyclic compounds, natural compounds with polyzoprenic skeleton.
At the thermic decomposition of vegetal remainings (350-400^0C) occur long life free radicals.
The long life radicals (over 700^0C) are decomposed in simpler radicals short life radicals (see the activation of black coal and development of active coal).
When burning the vegetal remainings at 350^0C free radicals as $3,10^{19}$/g or one radical for 1600 carbon atoms were found. Undoubtly that in the carbonization process, graphit crystals with partial orbitals at peripheric atoms are formed.
Reaching the soil at the same time with black coal application, the free radicals start chain reactions and modify the organic macromolecules of the pesticide absorbed meaning their decontamination by decomposition. The active coal and black coal are both effective in the weed biological control (see objective 1).
The weeds induce in soil organic substances inhibiting the seed germination of other weed species or of their own species.
Our strategy is focused on the destroying the weed seeds by germination during the soil biological recover.
The use of active or black coal enhance the effects mentioned in objective 1 and does the weed biological control in the next growing season, avoiding the yield losses, both quantitatively and qualitatively.

3. Optimization of external inputs of nutrients, plant protection products, water, energy and protection materials (replacing the plastic sheet with biodegradable vegetal film).

By the strategy proposed in objective 1, the amount of soil nutrients will be provided with the unwashable organic fertilizer produced by chemical fertilizer application in the way specified in the project.
This solution reduced highly the loss of soil nutrients.
That is possible because chemical fertilizers will not be washed out in the phreatic or deep soil layers.
Optimization of external inputs of bionutrients, thanks to others than those incorporated in soil, belong to the biological products.

For these products, it is significantly the ratio cost/quality related to the impact on the environment.
Definitely, for biological products used, the biodegradation characteristics and ratio: CO_2 given out / CO_2 fixed by plants, can be mentioned.
For the bionutrients and plant protection products the row material was the sea algae: Ascophyllum nodosum algae (Goemar , France).
The biopesticide to be incorporated in soil was obtained from Tagetas patula plants and Penicillium strains (Biophan natura naturans, Romania).
As regards the bionutrients and plant protection products, there is no problem to produce and use them in the field (www.goemar.com) but there are some inconvenients with the biopesticide, which could be solved.
From the economic point of view, the cost of the biopesticide produced by the specific technology is at the same level with the vegetal or phitosanitary products demanded on the market.
Concentration and preservation by (higher osmotic pressure) maintain the quality features of active biological products of vegetal origin.
Qualitatively, the final products meets the quality needs, but the cost is too high for the farmers. To preserve it and maintain its native characteristics, the concentrations should be 1:50, sometimes reaching to 1:100 concentration, the energy consumption going up and the price will be inaccessible.
After the concentration phase, the dilution (water added) is necessary for the soil incorporation.
Therefore, we suggest:
To maintain and have the same strategy and parameters when using vegetal solutions with active substances in synergy with Penicillium strains.
To maintain a technology and the processing phases to produce an active biological product under environmental and quality conditions.
Its preservation by osmotic pressure (concentration) and describing the application method on a certain crop.
Before the final phase (concentration by criogeny), solution with active substances 1:1 concentration, the product will be adequately stored until its use when it is defreezed. It is recommended to be applical during the growing seeson, shortening the time from production to application, for a better efficiently. An optimum application of this biopesticide will be if it is applied at the same time with water by drip irrigation system managed by computer.
The plastic sheet for the protection of strawberry crops is regarded as external input which will cause environmental unbalances in the crop fields and in the ratio CO_2 given out (external inputs) / CO_2 fixed by plants.
The biodegradable vegetal film is composed by proteins, lignce lulosis and glycerine by processing the rape grist, glycerinous waters or other industrial subproducts resulted excessively from fuels manufacture.
The product is formulated as gel it is water diluted and sprayed on soil becoming a biodegradable film.

4. **Ratio between: CO_2 given out (calculated in relation with external inputs) and CO_2 fixed by strawberry plants.**

In the present technology of strawberry crops, the ratio between CO_2 given out (due to external inputs / CO_2 fixed by plants goes towards CO_2 given out. The vegetal mass of strawberry plants is small and then CO_2 fixed by plants is low too.
It is very hazardous when the soil disinfection is done by methyl bromide.
Its lawful interdiction is not a solution.
A viable scientific– technical alternative is one of the best solutions. The alternative technology proposed improves the rates between CO_2 given out / CO_2 fixed, leading to an unitary ratio.

Major objectives in the proposed technology improving the ratio between CO_2 given out / CO_2 fixed.
Biological soil recover by an active rest period, doing a disease, pests and weed biological control.
In the initial phase, the weed seed stock in soil will be diminished by seed germination, weed development up to prematuration and their incorporation in soil to obtain an unwashable fertilizer. Plant protection by the biological control of diseases, pests production of organic fertilizer by means of weeds. Row material used:
-sea algae: Ascophylium nodosum algae and green mass obtained from Tagetas patula plants, increasing CO_2 fixed
-replacing the plastic sheet with vegetal biodegradable film.
The row material form the biodegradable vegetal film is the plant remainings which induce CO_2 fixing.
Reducing the energy consumption in biopesticide production.
Calcution way of ratio between CO_2 given out (due to external inputs) / CO_2 fixed by plants.
The calculation of external inputs is possible by calculating the specific equivalent for CO_2 given out for each external input, expressed in CO_2 tons of given out.
It is calculated CO_2 given out due to external inputs for a certain cropping area (Ex. 100 m^2).
Calculation of CO_2 fixed is done by collecting the vegetal cover on the cropping area.
The vegetal mass is carbonization.
After weighing the burnt product, CO_2 fixed is calculated according to equivalent carbon for the vegetal mass burnt after formula: 1 kg CO_2 is equet to 0.27 Kg (12/44=0,27 ; 12 C+2x 16 O = 44 CO_2).
The carbon amount equivalent to the burnt vegetal mass is the result between C amount resulted after carbonization of which is substracted. C amount absorbed from soil by the plants burnt the ratio between: CO_2 amount given out (calculated related to the external inputs) and CO_2 fixed by strawberry plants in the experimental plots within this project. There will be compared the alternative technology proposed and n classic technology used presently

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2. Mª Pilar Santamarina, Josefa Roselló, Reyes Llacer & Vicente Sanchis
Antagonistic activity of *Penicillium oxalicum* Corrie and Thom*, Penicillium decumbens* Thom and *Trichoderma harzianum* Rifai isolates against fungi, bacteria and insects *in vitro.*

3. Guijarro B, Larena I, (2002) Técnicas de formulación de *Penicillium frequentans* y su aplicación al control biológico. XI congreso de la Sociedad Española de Fitopatología. 14-18 octubre 2002.

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1.2 Progress beyond the stat-on-the-art

Within EU agrarian policies, three programs on the control and pesticides use in agriculture were initiated:
-a program for the human food and environment protection;
-a program on the sustainable agriculture and good cultural practices
-and a program on the preservation of natural resources, biodiversity included.
Therefore it was decided:

1. use of chemical pesticides into a limited extent just for avoiding the quantitative and qualitative yield losses;
2. reducing per area unit of the number of molecules from the chemical pesticides from 800 (present limit admitted) below 250.

To get such results, several alternative system for weed, pathogens and pests control in the field crops have been worked out. One of them is the integrated management system for the biological weed control as part of the Integrated Weed Control (IWM), the integrated biological system of the fungal pathogens from the field crops to which the present project proposal is joining.

This project proposal its based of the specialty thematic:

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Hille M., den Ouden J., 2005. Charcoal and activated carbon as adsorbate of phytotoxic compounds - a comparative study. Oicos. 108 (1): 202-207.

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Aksu Z., Kabasakal E., 2005. Adsorption characteristics of 2,4-dichlorophenoxyacetic acid (2,4-D) from aqueous solution on powdered activated carbon.J Environ Sci Health B. 40 (4): 545-570.

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- AGL2000-0067-P4-03 Producción y técnicas de formulación de Penicillium oxalicum para el control biológico de enfermedades. Inv. Ppal.: Paloma Melgarejo. 2001-2003 ;
- Accion COST 835 Agriculturally important toxicogenic fungi. Inv. Ppal.: Vicente Sanchís. 1998-2002;
- Antagonistic activity of Penicillium oxalicum Corrie and Thom, Penicillium decumbens Thom and Trichoderma harzianum Rifai isolates against fungi, bacteria and insects in vitro. Inv.Ppal: Mª Pilar Santamarina, Departamento de Biología Vegetal, E.U.I.T.A. Valencia, Spain; University of Lleida,CeRTA, Lleida, Spain 2002-2005.

The project proposal is based and lined up with the specific subjects approached at the International Congress such as:

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1.3 S/T methodology and associated work plan

Table 1.3 a: Work package list

Work package No[1]	Work package title	Type of activity[2]	Lead participant No[3]	Lead participant short name	Person-months[4]	Start month[5]	End month[5]
WP 1	Biologica control of diseases,pesta and weeds	RTD, MGT	1	Biophan	1110	01.01. 2008	30.10. 2012
WP 2	Decomposition of pesticide residuals	RTD, DEM, MGT	1	Biophan	560	01.04 2009	30.10. 2012
WP 3	Optimization of the external inputs of nutrients, water, energy and protection materials (replacing the plastic sheet with the biodegradable vegetal film).	RTD, MGT	1	Biophan	915	01.03. 2009	30.10. 2012
WP 4	Ration between CO_2 given out / CO_2 fixed	RTD, DEM MGT	1	Biophan	590	01.04. 2009	30.10. 2012
WP 5	Technological transfer	DEM MGT	1	Biophan	400	01.03. 2010	30.10. 2012
	TOTAL				3575		

[1] Workpackage number: WP 1 – WP n.

[2] Please indicate one activity per work package:

RTD = Research and technological development (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities); DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable in this call.

[3] Number of the participant leading the work in this work package.

[4] The total number of person-months allocated to each work package.

[5] Measured in months from the project start date (month 1).

Table 1.3 b: Deliverables List

Del. no.[1]	Deliverable name	WP no.	Nature[2]	Dissemi-nation level[3]	Delivery date[4]
1	Biologica control of diseases ,pesta and weeds	WP 1.1	R	PU	30.10.2008, 10 MONTHS
2	Optimization of the external inputs	WP 3.1	R	PU	30.10.2008 10 MONTHS
3	Biologica control of diseases ,pesta and weeds	WP 1.2	R	PU	30.10.2009 12 MONTHS
4	Decomposition of pesticide residuals	WP 2.1	R	PU	30.10.2009 12 MONTHS
5	Optimization of the external inputs	WP 3.2	R	PU	30.10.2009 12 MONTHS
6	Ration between CO_2 given out / CO_2 fixed	WP 4.1	R	PU	30.10.2009 12MONTHS
7	Biologica control of diseases ,pesta and weeds	WP 1.3	R	PU	30.10.2010 12 MONTHS
8	Decomposition of pesticide residuals	WP 2.2	R,D	PU	30.10.2010 12 MONTHS
9	Optimization of the external inputs	WP 3.3	R	PU	30.10.2010 12 MONTHS
10	Ration between CO_2 given out / CO_2 fixed	WP 4.2	R,D	PU	30.10.2010 12MONTHS
11	Technological transfer	WP 5.1	R,	PU	30.10.2010 12 MONTHS
12	Biologica control of diseases ,pesta and weeds	WP 1.4	R	PU	30.10.2011 12 MONTHS
13	Decomposition of pesticide residuals	WP 2.3	R,D	PU	30.10.2011 12 MONTHS
14	Optimization of the external inputs	WP 3.4	R	PU	30.10.2011 12 MONTHS
15	Ration between CO_2 given out / CO_2 fixed	WP 4.3	R,D	PU	30.10.2011 12MONTHS
16	Technological transfer	WP 5.2	R,D	PU	30.10.2011 12 MONTHS
17	Biologica control of diseases ,pesta and weeds	WP 1.5	R,P	PU	30.10.2012 12 MONTHS

1 Deliverable numbers in order of delivery dates. Please use the numbering convention <WP number>.<number of deliverable within that WP>. For example, deliverable 4.2 would be the second deliverable from work package 4.

2 Please indicate the nature of the deliverable using one of the following codes:
R = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

3 Please indicate the dissemination level using one of the following codes:
PU = Public
PP = Restricted to other programme participants (including the Commission Services).
RE = Restricted to a group specified by the consortium (including the Commission Services).
CO = Confidential, only for members of the consortium (including the Commission Services).

4 Measured in months from the project start date (month 1).

18	Decomposition of pesticide residuals	WP 2.4	R,D,P	PU	30.10.2012 12 MONTHS
19	Optimization of the external inputs	WP 3.5	R	PU	30.10.2012 12 MONTHS
20	Ration between CO_2 given out / CO_2 fixed	WP 4.4	R,D	PU	30.10.2012 12 MONTHS
21	Technological transfer	WP 5.3	R,D	PU	30.10.2012 12 MONTHS

Table 1.3 c: Work package description

Work package number	1	**Start date or starting event:**			**01.01.2008**	
Work package title	Biologica control of diseases,pesta and weeds					
Activity Type[1]	RTD,MGT					
Participant number	1	2	3	4	5	
Participant short name	Biophan	USAMV	RIFG	RISA-ICPA	IRAERD	
Person-months per participant:	455	200	200	200	55	

Objectives

Biological control of diseases,pest and weeds by soil-soil balance(on soil vertical line) and soil-plant balance (on soil horizontal line)

Description of work (possibly broken down into tasks), and role of participants
Biophan :
task 1 : : coordinating activities and management of the portofolio ;
task 2 : Production of the pesticide proposed in the pilot plant. Chemical and biochemical analyses of the biopesticides, preliminary microbiological soil analyses. Preliminary lab. tests of the specific strawberry pathogens on nutrient media. Organization of data base.
Establishment of the experimental plot sat P1, P2, P3 and subcontracting partner.
task 3 :Commercial experimental plots. Monitorizing of the field crops. Unpredicted parameters and uncertain factors to be controlled.
task 4 : Biological soil preparation: biological soil properties in the experimental plots; methods for the biological control of disease, pests and weeds in each plot.. Application of WP 1.1. strategies. Monitorizing the specific phenomena of the biological control and recover of biological soil balance. Processing of field data with needed corrections. Establishment of strawberry runners nursery. Collecting of data for WP2, WP3, WP4.
Effects of the biological control specifically to this project. Correction of technological alternative parameters related to WP2, WP3, WP4 results. Lab. and field biocontrol tests for the new corrections. Monitorizing of the evolution of field strawberry crop in due time.
task 5 : Quantification in the final phase. Settling the methodologic parameters of biological control and / or disease, pests, weed integrated control in the strawberry crops. Final evolution of the ecological parameters of edaphic microbial populations under alternative technological conditions in the experimental strawberry fields.
USAMV :
task 1: Working methods and techniques involved. Screening for selecting the studied phenotype,

[1] Please indicate one activity per work package:
RTD = Research and technological development (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities); DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable.

biopesticides and biofertilizers tested.
task 2: Initial investigation of the edaphic microflora ecological factors in the soil of the experimental fields to settle the most adequate alternative techniques to improve the further evolution of ecosystem and have a functional ecological balance.
task 3 : Study of edaphic microflora subjected to the alternative technology involving the biological control under specific stress conditions of strawberry crops.
task 4 : Study of the efficiency of the alternative technologically application based of the pathogens biological control, soil microflora protection in case of severe pathogenic attacks. Modifications induced by the edaphic microbial species by using an alternative technology and the response of strawberry cv. cropped.
RIFG:
task 1: Selecting the strawberry cvs. For this project and purchasing of 3 strawberry cvs. patent.
task 2: Monitorizing the specific phenomena of the biological control and recover of biological soil balance. Establishment of strawberry runners nursery.
task 3 : Effects of the biological control specifically to this project. Correction of technological alternative parameters related to WP2, WP3, WP4 results.
task 4 : Commercial experimental plots. Monitorizing of the field crops. Unpredicted parameters and uncertain factors to be controlled. Collecting of data for WP2, WP3, WP4. Monitorizing of the evolution of field strawberry crop in due time.
RISA-ICPA:
task1 : Initial microbiological analyses in the soil of the experimental plotswith indexes for he characterization of present balance in the microorganism populations (microorganisms density, colonization index with micromycetes, ratio: saprophites/pathogens, characterization indexes of specific variability, level of global physiological activity in microflora).
task2 : Pedological and physico-chemical characterization of soil types experimented (analyses of content, total and organic carbon.
task3 : Permanent monitoring of quantitative and qualitative evolution of edaphic microorganisms under conditions of alternative technology based on the biological control versus the classic technology, related to soil type, strawberry cv. and specific stress, related factors.
task4 : Selecting of final characterization indicators for the efficiency of alternative technology which will prove soil recover from the microbiological standpoint.
IRAERD:
task1 : Informational study with regard to strawberry crop development at home and abroad; calculation methodology of technical-economic indicators to reach the efficiency of plant protection technology.
task2 : Calculation methodology of technical-economic indicators to reach the efficiency of plant protection technology.

Deliverables (brief description and month of delivery)
WP 1.1 30.10.2008
Preliminary measures for the biological soil preparation. Production of the biopesticide proposed in the pilot plant.
Chemical and biochemical analyses of the biopesticide, preliminary microbiologicalsoil analyses.
Preliminary lab.test of the specific strawberry pathogens on nutrient media.
Organization of data base.
Working methods and techniques involved.Screening for selecting the studied phenotype , biopesticides, and biofertilizers tested. Selecting the strawberry cvs. For this project and purchasing of 3 strawberry cvs. patent.
Initial investigation of the edaphic microflora ecological factors in the soil of the experimental fields to settle the most adequate alternative techniques to improve the further evolution of ecosystem and have a functional ecological balance. Initial microbiological analyses in the soil of the experimental plotswith indexes for he characterization of present balance in the microorganism populations (microorganisms density, colonization index with micromycetes, ratio: saprophites/pathogens, characterization indexes of specific variability, level of global physiological

activity in microflora).
Informational study with regard to strawberry crop development at home and abroad; calculation methodology of technical-economic indicators to reach the efficiency of plant protection echnology.

WP 1.2. 30.10.2009

Establishment of the experimental plot sat P1, P2, P3 and subcontracting partner. Biological soil preparation: biological soil properties in the experimental plots; methods for the biological control of disease, pests and weeds in each plot.
Study of edaphic microflora subjected to the alternative technology involving the biological control under specific stress conditions of strawberry crops. Pedological and physico-chemical characterization of soil types experimented (analyses of content, total and organic carbon).
Application of WP 1.1. strategies. Monitorizing the specific phenomena of the biological control and recover of biological soil balance. Processing of field data with needed corrections. Establishment of strawberry runners nursery.

WP 1.3. 30.10.2010

Commercial experimental plots. Monitorizing of the field crops. Unpredicted parameters and uncertain factors to be controlled. Collecting of data for WP2, WP3, WP4.
Modifications induced by the edaphic microbial species by using an alternative technology and the response of strawberry cv. cropped. Permanent monitoring of quantitative and qualitative evolution of edaphic microorganisms under conditions of alternative technology based on the biological control versus the classic technology, related to soil type, strawberry cv. and specific stress, related factors.

WP 1.4. 30.10.2011

Effects of the biological control specifically to this project. Correction of technological alternative parameters related to WP2, WP3, WP4 results. Lab. and field biocontrol tests for the new corrections.
Monitorizing of the evolution of field strawberry crop in due time.
Study of the efficiency of the alternative technologically application based of the pathogens biological control, soil microflora protection in case of severe pathogenic attacks. Selecting of final characterization indicators for the efficiency of alternative technology which will prove soil recover from the microbiological standpoint.

WP 1.5 30.10.2012

Quantification in the final phase. Settling the methodologic parameters of biological control and / or disease, pests, weed integrated control in the strawberry crops. Final evolution of the ecological parameters of edaphic microbial populations under alternative technological conditions in the experimental strawberry fields.

Table 1.3 c: Work package description

Work package number	2	Start date or starting event:				01.04.2009
Work package title	**Decomposition of pesticide residuals**					
Activity Type[1]	RTD,DEM,MGT					
Participant number	1	2	3	4		
Participant short name	Biophan	USAMV	RIFG	RISA-ICPA		
Person-months per participant:	288	91	90	91		

Objectives

Adsorption on the active charcoal and decomposition of pesticide residues in soil.

Description of work (possibly broken down into tasks), and role of participants

Biophan :

task 1 : coordinating activities and management of the portofolio ;

task 2 : Soil measurements in the experimental plots, lab. analyses of the weed seeds and pesticide residuals.

Production support plates for fixing the active coal and do lab. tests. Obtaining black coal from the vegetal remainings. Production of active coal. Purchasing of active coal from special companies for simultaneous tests. RES analysis of free radicals.

Lab. tests. Adsorbtion test son active coal of the pesticide residues and inhibitors in the weed seeds (C^{14}). Transfer determination from seeds during the germination cycle to the active coal support plates.

Incorporation of coal in the soil of experimental plots. Observations for the specific phenomena regarding the decomposition pesticide residues.

task 3 : Biocontrol tests in the glasshouse and field by using active coal as fixed and powder form. Soil microbiological analysis after the specific phases. Lab. and field tests after the corrections.

task 4 : Administration of the active coal in the soil of the experimental plots,. Correction of the alternative technological parameters related to results recorded with WP2, WP3, WP4. Lab. and field biocontrol tests for the new solutions resulted after corrections. Monitorizing, in due time, the development of field crops. Collecting results for WP3, WP4.Monitorizing of the evolution of field strawberry crop in due time.

task 5 : Quantification in the final phase. Settling the methodologic parameters for coal utilization in the strawberry crops as the alternative technology, mentioned in WP 2.4

USAMV :

task 1: Incorporation of coal in the soil of experimental plots. Observations for the specific phenomena regarding the decomposition pesticide residues.

task 2: Monitorizing the effects caused to soil following the active coal use.

Monitorizing and analysis of pesticide residuals, weed development in the control plots and active coal treatments.

Study of interaction phenomenon between plants (allelopathy); effects of treatments on the edaphic microflora.

task 3 : Monitorizing and observations of the field crops, where the active coal was applied. Gathering of results and data for WP3, WP 4.

task 4 : Quantification in the final phase. Settling the methodologic parameters for coal utilization in

[1] Please indicate one activity per work package:
RTD = Research and technological development (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities); DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable.

the strawberry crops as the alternative technology, mentioned in WP 2.4.
RIFG:
task 1: Soil measurements in the experimental plots, lab. analyses of the weed seeds and pesticide residuals.
task 2: Monitorizing the effects caused to soil following the active coal use.
Monitorizing and analysis of pesticide residuals, weed development in the control plots and active coal treatments.
task 3 : Monitorizing of soil effects caused by coal application. Processing of the data and results recorded with WP 1, and WP 2 for a correlated strategy to be used in the experimental plots.
RISA-ICPA:
task1 : Performing tests under controlled conditions and microbiological analyses of soil in the experimental plots in the treatments with and without active coal.
task2 : Monitoring and evaluation of active coal effects on the microbial components of soil in order to choose the most favorable application treatment.

Deliverables (brief description and month of delivery)

WP 2.1. 30.10.2009
Soil measurements in the experimental plots, lab. analyses of the weed seeds and pesticide residuals.
Production support plates for fixing the active coal and do lab. tests. Obtaining black coal from the vegetal remainings. Production of active coal. Purchasing of active coal from special companies for simultaneous tests. RES analysis of free radicals.
Lab. tests. Adsorbtion test son active coal of the pesticide residues and inhibitors in the weed seeds (C^{14}). Transfer determination from seeds during the germination cycle to the active coal support plates.
Incorporation of coal in the soil of experimental plots. Observations for the specific phenomena regarding the decomposition pesticide residues.
WP 2.2. 30.10.2009
Biocontrol tests in the glasshouse and field by using active coal as fixed and powder form.
Monitorizing the effects caused to soil following the active coal use.
Monitorizing and analysis of pesticide residuals, weed development in the control plots and active coal treatments.Study of interaction phenomenon between plants (allelopathy); effects of treatments on the edaphic microflora.
WP 2.3. 30.10.2010
Soil microbiological analysis after the specific phases. Monitorizing of soil effects caused by coal application. Processing of the data and results recorded with WP 1, and WP 2 for a correlated strategy to be used in the experimental plots. Lab. and field tests after the corrections. Monitorizing and observations of the field crops, where the active coal was applied. Gathering of results and data for WP3, WP 4.
WP 2.4. 30.10.2011
Administration of the active coal in the soil of the experimental plots. Correction of the alternative technological parameters related to results recorded with WP2, WP3, WP4. Lab. and field biocontrol tests for the new solutions resulted after corrections. Monitorizing, in due time, the development of field crops. Collecting results for WP3, WP4.
WP 2.5. 30.10.2012
Quantification in the final phase. Settling the methodologic parameters for coal utilization in the strawberry crops as the alternative technology, mentioned in WP 2.4.

Table 1.3 c: Work package description

Work package number	3	**Start date or starting event:**				**01.01.2008**
Work package title	Optimization of the external inputs of nutrients, water, energy and protection materials (replacing the plastic sheet with the biodegradable vegetal film).					
Activity Type[1]	RTD,MGT					
Participant number	1	2	3	4	5	
Participant short name	Biophan	USAMV	RIFG	RISA-ICPA	IRAERD	
Person-months per participant:	460	120	120	120	95	

Objectives

Optimization of external inputs in terms of nutrients, water, energy and protection materials (replacing the plastic sheet with biodegradable vegetal film).

Description of work (possibly broken down into tasks), and role of participants

Biophan :

task 1 : coordinating activities and management of the portofolio ;
task 2 : Approaches, studies, lab. tests to find out the working methods, elaboration of the working draft for each method used in optimization the external inputs.
Settling the parameters directing the management strategy of the project with regard to the testing methods and their selection for: decrease of external inputs and costs as well as raise of product quality (price/ best quality).
task 3 : Studies and examination specifically to WP1 and WP2. Improvement proposals. Technical-scientific, economico-financial study, prognosis, postcalculation for the proposed experimental plots.
Monitorizing in the experimental plots specifically to WP3
task 4: Further monitorizing of the optimum methods and evaluation of results. Finding out the techniques for the experimental plots. Quantification of the economic effects of the alternative technology with regard to external inputs increasing the crop field; comparative study of efficiency for the experimental alternative technologies.
task 5: Quantification in the final phase. The optimum parameters (technical-scientific and economic-financial) applicable to the alternative technology of strawberry crop. Economic quantification of the final technology for the strawberry crop directed to the biological agriculture; plots of various sized acreages for the commercial plantings with high profitableness; technical-economic information provided to the farmers to get loans for establishing commercial strawberry crop.
USAMV :
task 1: Examination of the present technology for the strawberry crop, according to the specific parameters of this project
task 2: Technical-scientific, economic-financial study, prognosis, postcalculation. Technical-

[1] Please indicate one activity per work package:
RTD = Research and technological development (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities); DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable.

scientific survey of the classic technology related to the cultivars and favorable growing areas.
task 3 : Application of proposal from WP 3.2. and their evaluation in due time.
task 4 : Technical-scientific, economico-financial study, prognosis, postcalculation for the proposed experimental plots.
RIFG:
task 1: Examination of the present technology for the strawberry crop, according to the specific parameters of this project. Technical-scientific, economic-financial study, prognosis, postcalculation. Impact of the strawberry crop on the production in the agricultural farms.
task 2: Quantification of the technical effects of the alternative technology with regard to external inputs increasing the crop field; comparative study of efficiency for the experimental alternative technologies.
task 3 :. Technical-scientific, economico-financial study, prognosis, postcalculation for the proposed experimental plots.
Monitorizing in the experimental plots specifically to WP3.
RISA-ICPA:
task1 : Comparison of the effects in case of strawberry classic technology with the alternative technology based on improving of the nutrients and water regime and use of biodegradable vegetal film instead of plastic sheet by analyzing the structure of microbial populations, of total microbial biomass, of edaphic microflore global activity (measured by CO_2 emission).
IRAERD:
task1 : Documentary study of the national and international research regarding the utilization of the external inputs for the strawberry crop. Economical-financial approach of the present technology for the strawberry crop versus the alternative technology proposed.
task2 : Economic-financial study, prognosis, postcalculation :
-impact of the strawberry crop on the production in the agricultural farms;
-estimations regarding the economic effects of new alternative technologies proposed for the strawberry crops within the biological agriculture system.
task3 :Quantification of the economic effects of the alternative technologies with regard to external inputs increasing the crop field; comparative study of efficiency for the experimental alternative technologies.

Deliverables (brief description and month of delivery)

WP 3.1. 30.10.2008
Approaches, studies, lab. tests to find out the working methods, elaboration of the working draft for each method used in optimization the external inputs.
Settling the parameters directing the management strategy of the project with regard to the testing methods and their selection for: decrease of external inputs and costs as well as raise of product quality (price/ best quality).
Examination of the present technology for the strawberry crop, according to the specific parameters of this project. Documentary study of the national and international research regarding the utilization of the external inputs for the strawberry crop. Economical-financial approach of the present technology for the strawberry crop versus the alternative technology proposed.
WP 3.2. 30.10.2009
Technical-scientific, economic-financial study, prognosis, postcalculation
technical-scientific survey of the classic technology related to the cultivars and favorable growing areas;
impact of the strawberry crop on the production in the agricultural farms;
estimations regarding the economic effects of new alternative technologies proposed for the strawberry crops within the biological agriculture system.
Studies and examination specifically to WP1 and WP2.Improvement proposals.
WP 3.3. 30.10.2010
Application of proposal from WP 3.2. and their evaluation in due time. Further monitorizing of the optimum methods and evaluation of results. Finding out the techniques for the experimental plots. Quantification of the economic effects of the alternative technology with regard to external inputs

increasing the crop field; comparative study of efficiency for the experimental alternative technologies.
WP 3.4. 30.10.2011
Technical-scientific, economico-financial study, prognosis, postcalculation for the proposed experimental plots.
Monitorizing in the experimental plots specifically to WP3. Quantification of the economic effects of the alternative technologies with regard to external inputs increasing the crop field; comparative study of efficiency for the experimental alternative technologies.
WP 3.5. 30.10.2012
Quantification in the final phase. The optimum parameters (technical-scientific and economic-financial) applicable to the alternative technology of strawberry crop. Economic quantification of the final technology for the strawberry crop directed to the biological agriculture; plots of various sized acreages for the commercial plantings with high profitableness; technical-economic information provided to the farmers to get loans for establishing commercial strawberry crop.

Table 1.3 c: Work package description

Work package number	4	**Start date or starting event:**			**01.04.2009**	
Work package title	Ration between CO_2 given out / CO_2 fixed					
Activity Type[1]	RTD,DEM,MGT					
Participant number	1	2	3				
Participant short name	Biophan	USAMV	RIFG				
Person-months per participant:	350	120	120				

Objectives
Balance between: CO_2 given out (calculated related to the external inputs) and CO_2 amount fixed by the plants in the strawberry .

Description of work (possibly broken down into tasks), and role of participants

Biophan :

task 1 : coordinating activities and management of the portofolio ;
task 2 : Prognosis regarding the ratio between CO_2 given out / CO_2 fixed, which will be the target in the proposed alternative technology.
Settling the parameters to direct the management strategy of the project for selecting the testing methods related to the ratio: CO_2 given out / CO_2 fixed. Finding out the „key" advantages within this technology which will lead to a decrease of CO_2 emission and an increase of CO_2 fixed amount.
task 3 : Research-technical examination of the methods proposed with regard to the ratio between CO_2 emitted / CO_2 fixed and of target task parameters. Suggestions to improve the ratio: CO_2 emitted / CO_2 fixed.
task 4 : Settling the working methods for the experimental plots. Their application. The calculation of balance between: CO_2 amount emitted (related to the external inputs) and CO_2amount fixed by the plants in the strawberry crops will be done for each experimental plot.
Monitorizing in the experimental plots specifically to WP4.

[1] Please indicate one activity per work package:
RTD = Research and technological development (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities); DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable.

task 5 : Quantifications in the final phase. Finding out the optimum parameters with regard to the ratio: CO_2 emitted / CO_2 fixed for the alternative technology of the strawberry crop.

USAMV :

task 1:. Settling the ratio between CO_2 given out / CO_2 fixed afferent to the present technology of the strawberry crop. Comparative approach of the present technology of strawberry crop according to the parameters involved in this project.

task 2: Application of proposals from WP 4.1. and WP 4.2. in the experimental plots, their evaluation in due time (monitorizing, gathering of results and a scientific – technical examination of each variant specific to WP1 and WP2).

task 3 : Monitorizing in the experimental plots specifically to WP4, gathering of results and a scientific-technical examination after application of methodology specifically to WP1, WP2 and WP3.

RIFG:

task 1: Settling the ratio between CO_2 given out / CO_2 fixed afferent to the present technology of the strawberry crop. Comparative approach of the present technology of strawberry crop according to the parameters involved in this project.

task 2: Application of proposals from WP 4.1. and WP 4.2. in the experimental plots, their evaluation in due time (monitorizing, gathering of results and a scientific – technical examination of each variant specific to WP1 and WP2).

task 3 : Monitorizing in the experimental plots specifically to WP4.

Deliverables (brief description and month of delivery)

WP 4.1. 30.10.2008

Settling the ratio between CO_2 given out / CO_2 fixed afferent to the present technology of the strawberry crop.

Prognosis regarding the ratio between CO_2 given out / CO_2 fixed, which will be the target in the proposed alternative technology.

Settling the parameters to direct the management strategy of the project for selecting the testing methods related to the ratio: CO_2 given out / CO_2 fixed.

Comparative approach of the present technology of strawberry crop according to the parameters involved in this project.

Finding out the „key" advantages within this technology which will lead to a decrease of CO_2 emission and an increase of CO_2 fixed amount.

WP 4.2. 30.10.2009

Research-technical examination of the methods proposed with regard to the ratio between CO_2 emitted / CO_2 fixed and of target task parameters. Application of proposals from WP 4.1. and WP 4.2. in the experimental plots, their evaluation in due time (monitorizing, gathering of results and a scientific – technical examination of each variant specific to WP1 and WP2). Suggestions to improve the ratio: CO_2 emitted / CO_2 fixed.

WP 4.3. 30.10.2010

Settling the working methods for the experimental plots. Their application.

Monitorizing in the experimental plots specifically to WP4, gathering of results and a scientific-technical examination after application of methodology specifically to WP1, WP2 and WP3.

WP 4.4. 30.10.2011

The calculation of balance between: CO_2 amount emitted (related to the external inputs) and CO_2amount fixed by the plants in the strawberry crops will be done for each experimental plot.

Monitorizing in the experimental plots specifically to WP4.

WP 4.5. 30.10.2012

Quantifications in the final phase. Finding out the optimum parameters with regard to the ratio: CO_2 emitted / CO_2 fixed for the alternative technology of the strawberry crop.

Table 1.3 c: Work package description

Work package number	**5**	**Start date or starting event:**				**01.03.2010**
Work package title	Technological transfer					
Activity Type[1]	RTD, DEM, MGT					
Participant number	1	2				
Participant short name	Biophan	IRAERD				
Person-months per participant:	350	50				

Objectives

Implementation of on alternative technology for the strawberry crop: experimental plots, technological, technico-economic instructions provided to farmers to be able to get loans and establish strawberry crop son various sized acreages.

Description of work (possibly broken down into tasks), and role of participants

Biophan :

task 1 : coordinating activities and management of the portofolio ;

task 2 : Establishment of experimental plots and commercial plantings with subcontracting parties to the project, according to the draft (s) agreed for WP1, WP2, WP3, WP4. Settling the working technique for the experimental plots. Their application in the experimental plots. Monitorizing of the experimental plots, the technology application in the first phase of technological transfer and the quantification of this activity.

task 3 : Scientific and technological examination following the technological transfer and its efficiency. Monitorizing of the alternative technology for the strawberry crop (specific parameters), gathering of results and a scientific-technical, economic-financial approach following each parameter utilization.

task 4 : Quantification in the final phase. The optimum parameters settled for the technological transfer. Final dissemination. A full technological and technico-economic information provided to the future farmers or farmer s associations for facilitating the obtaining of loans to establish their strawberry plantings on various sized acreages.

IRAERD :

task 1:

Technical-economic substantiation of classical (traditional) technologies, according to varieties and favourable zones;

strawberry crop impact on farm production structure;

estimated economic effect of new alternative technologies proposed by specialized technical research for field strawberry crops in a cultivation system oriented towards organic agriculture;

task 2:

Estimation of economic effect of experimental alternative technological variants, to evaluate used inputs influence on crop production profitableness;

a comparative analysis of efficiency in experimental

estimation of economic effect of experimental alternative technological variants, to evaluate used

[1] Please indicate one activity per work package:
RTD = Research and technological development (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities); DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable.

inputs influence on crop production profitableness;
a comparative analysis of efficiency in experimental
task 3 :
Economic estimation of final technological variants for field strawberry crop oriented towards organic agriculture;
design of various size modules for field strawberry crop, when applying economically viable, highly profitable technologies in farms;
preparation of technical-economic documentation for the farmers willing to have access to credits for field strawberry crops established by modules of different size.

Deliverables (brief description and month of delivery)

WP 5.1. 30.10.2010.
Establishment of experimental plots and commercial plantings with subcontracting parties to the project, according to the draft (s) agreed for WP1, WP2, WP3, WP4. Settling the working technique for the experimental plots. Their application in the experimental plots. Monitorizing of the experimental plots, the technology application in the first phase of technological transfer and the quantification of this activity.
Technical-economic substantiation of classical (traditional) technologies, according to varieties and favourable zones; strawberry crop impact on farm production structure;estimated economic effect of new alternative technologies proposed by specialized technical research for field strawberry crops in a cultivation system oriented towards organic agriculture;
WP 5.2. 30.10.2011.
2. Scientific and technological examination following the technological transfer and its efficiency. Monitorizing of the alternative technology for the strawberry crop (specific parameters), gathering of results and a scientific-technical, economic-financial approach following each parameter utilization.
Estimation of economic effect of experimental alternative technological variants, to evaluate used inputs influence on crop production profitableness; a comparative analysis of efficiency in experimental estimation of economic effect of experimental alternative technological variants, to evaluate used inputs influence on crop production profitableness; a comparative analysis of efficiency in experimental .
WP 5.3. 30.10.2012
Quantification in the final phase. The optimum parameters settled for the technological transfer. Final dissemination. A full technological and technico-economic information provided to the future farmers or farmer s associations for facilitating the obtaining of loans to establish their strawberry plantings on various sized acreages.

Economic estimation of final technological variants for field strawberry crop oriented towards organic agriculture; design of various size modules for field strawberry crop, when applying economically viable, highly profitable technologies in farms; preparation of technical-economic documentation for the farmers willing to have access to credits for field strawberry crops established by modules of different size.

Table 1.3d Summary of staff effort

Participant no./short name	WP1	WP2	WP3	WP4	WP5	Total person months
Part.1 Biophan	455	288	460	350	350	1903
Part.2 USAMV	200	91	120	120	0	531
Part.3 RIFG	200	90	120	120	0	530
Part.4 RISA-ICPA	200	91	120	0	0	411
Part.5 IRAERD	55	0	95	0	50	200
Total	1110	560	915	590	400	3575

Table 1.3e List of milestones

Milestone number	Milestone name	Work package(s) involved	Expected date [1]	Means of verification[2]
1	biopesticid	Production of the pesticide proposed in the pilot plant	Before the final phase (concentration by criogeny)	biochemical analyses of the biopesticide proposed PhytoLab GmbH & Co. KG, Germany
2	black coal	black coal application	The long life radicals (over 700^0C) are decomposed in simpler radicals short life	Analysis of free radicals in the black coal by Spin Electronic Resonance (RES).
3	calculated in relation with external inputs	Ratio between: CO_2 given out (calculated in relation with external inputs) and CO_2 fixed by strawberry plants	CO_2 given out calculated in relation with external inputs.	Diagram as CO_2 given out calculated in relation with external inputs

[1] Measured in months from the project start date (month 1).
[2] Show how you will confirm that the milestone has been attained. Refer to indicators if appropriate. For example: a laboratory prototype completed and running flawlessly; software released and validated by a user group; field survey complete and data quality validated.

2. Implementation
2.1 Management structure and procedures

The management structure includes a procedures package to cover the project requirements: limitation in space (crop field) and time (period of crop cycle).
Therefore, the distance between the project co-ordinator and partners, between these and subcontracting parties (which do the work in the experimental plots) shall be 200 km. So, the organizational structure and decision-making (OSDM) have both a general and individual characteristics.
General characteristics of the project management
The project management from the beginning till the end is provided by at an including: project manager and scientific coordinator in cooperation with the project managers of the partners.

The project head is in charge of project management having the following duties:
▲ submit the project proposal and appoint the project manager who will be in charge of managing and coordinating all things connected to the project;
▲ integrate the various elements from all fields and to avoid the collisions between the working groups; represent the partners in the relationships with the the Monitoring Commission;
▲ set the strategy, means as well as organization and communication system between partners or between them and the Coordinator;
▲ optimize the distribution of resources (material, human and financial) to find the best solutions at the lowest costs in the global achievement.

The management, coordination and communication methods adapted by the project manager for a unitary management consist in the foresights (prognosis, strategies and planning) on the project implementation and direction (motivation, building, training and managing of the whole staff of specialists and resources involved as well as coordination and control (synchronization, balancing and monitoring) activities carried in this project.

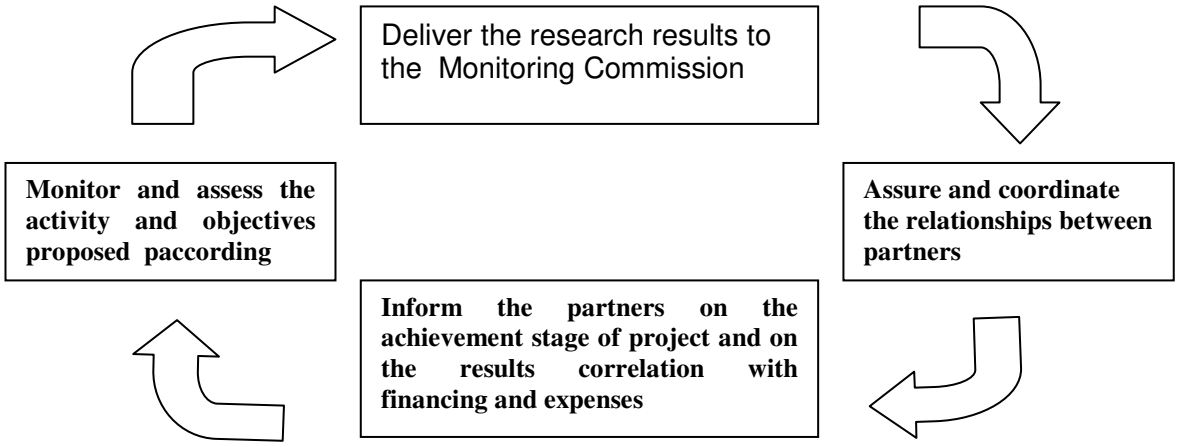

Fig. 2 General working scheme of the project manager.
The project manager is the person who elaborate “The Plan for Project Achievement” and he will be able to monitor every stage in project running and contribution of each partner to these stages.

The project management (methods, ways of management, coordination and communication is one and unitary by double connection like feed-back:

1.From the Monitoring Commission through the project manager (as regards operation, administration and research worker;

2. From the research worker, trough the project manager, to the Monitoring Commission
The information links of any kind (administrative, economic-financial) between the Monitoring Commission through project manager, and the project partners are done according to legislation in force force of U.E and of the participant soil.

Communication between the project manager and partners involved is done by:

- Web site (provided to project by Coordinator) which can be accessed by a password, providing directions, questions and answers, etc.;
- E-mail for information exchange, telephone, mobile phone, fax, direct communication by means of a self lab equipped with measure and control meters, air conditioning system for transporting the samples from field and green house to analysis lab.

b. Specific characteristics of the project management :

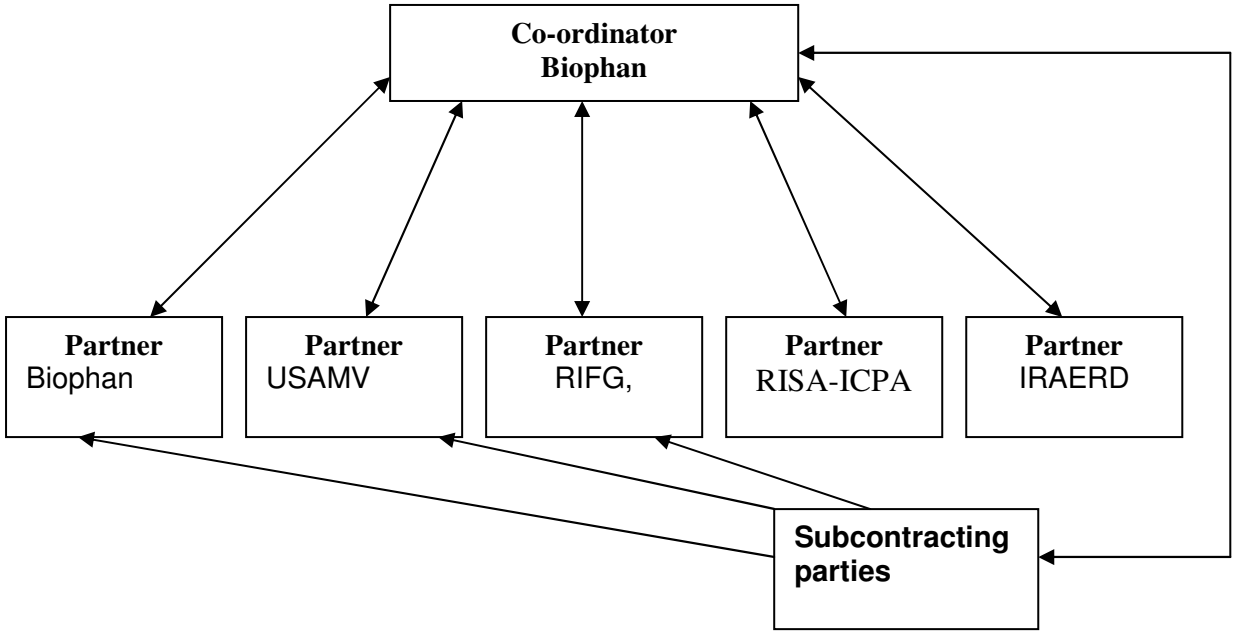

fig . 5 Inter-relationship scheme of the project.

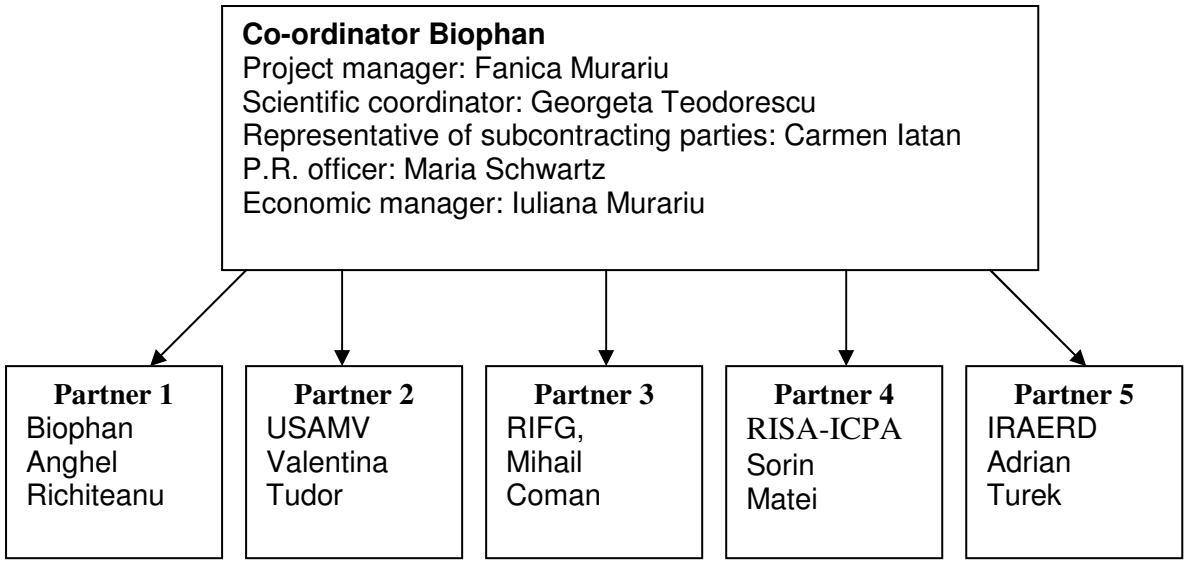

fig. 6 Decisional and responsability scheme of the project.

2.2 Individual participants

Description of Biophan natura naturans

Biophan natura naturans is a research organization with full private capital organized as commercial society based on: Research and development in physical and natural sciences, code CAEN 7310.
Biophan natura naturans carries on RTD activities directed to the technological transfer in the agricultural field: integrated, biological control of diseases, pests and weeds in horticultural and vegetable crops.
Within R.T.D. Department Biophan has a performant plant protection lab., a production microsector (biopesticides and active coal), special equipment for establishment and management of horticultural crops in the experimental plots.
Biophan natura naturans completes that sequence within RTD structural chain involving an the firstly university, followed secondly by the national RTD, large institutes and then by RTD small enterprises (Biophan) reaching finally to the farmer.
The project manager, scientific coordinator and the senior researchers belonging to Biophan natura naturan steam have gained their experience in RTD large institutes.

Project manager: Fanica Murariu, Senior researcher
Experience in management of the research projects and research programs implementation, expert in the investigations of biochimistry-biophysics, plant pathogens, biocontrol of plant pathogens, microbial antagonism, bioinoculants, ecology of fungal populations.
Role in the project: Project management and structure, laboratory tests of microbial antagonism, assessment of the influence of alternative technology for strawberry culture on fungal microflora, monitoring of the biological control of diseases, pests and weeds in the strawberry crop
.
Scientific coordinator: prof. Georgeta Teodorescu, Senior researcher, expert in the testing and biological control of the fungal pathogens in the horticultural crops.
Role in the project: co-ordination of management and research activities within the project.

Project head: prof. Anghel Richiteanu, Senior researcher, mycologist, experience in plant protection field, symptomathlogy, pathogenesis, epidemiology, ecology.
Role in the project: project head on behalf of Biophan natura naturans.

Senior researcher:
Chitu Emil, ecophysiology, agricultural technologies;
Cristian Popescu, agrochemistry, agrotechnology;
Maria Oprea, mycologist, plant protection;
Cristina Cristescu, biologist, biological control of fungal pathogens;
Monica Neblea, biologist, fitosociologist;
Monica Fleancu, biologist, plant physiology, plant ecophysology;
Viorica Chitu, horticultural technologies, strawberry agrotechnology.

Junior researcher: Raluca Murariu, biochemistry, biopesticides and active coal production, Carmen Iatan, biology – biochemistry, biological control of diseases, pathogens and weeds.

Economic manager: Iuliana Murariu, Senior economist, management of financial, material and human resources.
Public relations office: Maria Schwartz , Philologist, English, French, German.

Description of the University of Agronomic Sciences and Veterinary Medicine of Bucharest

The University of Agronomic Sciences and Veterinary Medicine – Bucharest is the oldest (150 years), biggest and most appreciated agronomic university in the country.
It is structured in seven faculties, master courses, doctor's degree courses and post-graduate training courses are also organized. It has long distance education. The university holds an impressive material and logistic support but it also has a valuable professional team.
It has a scientific research department and lot of experience in making research & development projects and programs at a national, European and bilateral international level.
With a valuable scientific research, development and innovation potential, USAMV Bucharest made an impressive progress in involving teaching staff both in the development of research projects and the coordination of ones own projects or co partners in a wide diversity of national, international and bilateral research and development - innovation or training education programs.
The most important elements of the University are the wide diversity of staff as regards to age, work and effort capacity, to the experience gained in the process of leading projects and programs (university tutors, professor's assistants, lecturers and projects managers, scientific researchers, and professors who have developed and led grant programmes, PHG trainees or other CDI activities), and the academic structure, professional balanced and valuable gained experience.

Project head:Valentina TUDOR , Research Senior
.Lecturer at the Faculty of Management, Economic Engineering and Rural Development and Researcher at the Research and Development Institute for Agricultural Economy and Rural Development ,Experience in Horticulture, Farm Management and Rural Development.Experiences in management of the research projects and research programs implementation Member in the teams of research projects.
Experience in survey and investigations regarding the technological, technical and economical aspects of the horticultural farms.

Georgeta TEMOCICO,Research Senior
Fruit growing specialist .R&D experience in the field of orchard and nursery – 15 years .Experiences in management of the research projects and research programs implementation .Project leader of two research projects concerning the new technologies for strawberry growing and author of three broachers concerning the strawberry: varieties, new technologies and multiplication methods.
Member in team research projects as well as member in team research activties.
Experiences in researches regarding the implementation of the new and modern nursery techniques in order to increase the efficiency and competitiveness in the production and valorization of the fruit production (strawberry, cherry, apricot, peach and plum).

Viorel ION, Research Senior
Lecturer at Field Crop Production Department, Faculty of Agriculture.
Experience in the management of the research and development projects and team member in different research projects. Experience concerning the filed crops and experience in crop technologies, agricultural extension and dissemination activities.

Ionel JINGA,Professor, Research Senior
Experience in research in the field of– 43 years, 212 publications.
Expert in evaluation of projects from National Research Programs: CNCSIS, AGRAL, RELANSIN; Correspondent member of Academy of Agronomical Sciences and Forestry – Pedology, Agro-chemistry, and Hydro-Amelioration.

Professional competence: Landed amelioration, crops irrigation, hydro-amelioration, hydrology, hydrogeology.

Stelica CRISTEA,Professor, Research Senior
Genetics, Amelioration and Plant Protection Department, Faculty of Agriculture .Experiences in researches regarding the testing of some hidroalchoolic extracts in controlling of some fungus pathogen (Botrytis cinerea, Fusarium sp., Alternaria sp.) on the horticultural plants (tomato, strawberry, grapevine).Experience in testing the effectiveness of some products applied to control of some soil and seed pathogens at crops and horticultural plants. Researches regarding the biological parameters of the fungus pathogen at crops and fruits Researches concerning the antagonist effect of some microorganisms upon the development of some fungus pathogen at seeds crops.Researches concerning phytosanitary situation of crop in ecological agriculture.Experience in the management of the researches and development projects and teams member in differents researches activities.

Description of RIFG Pitesti-Maracineni, Research Institute for Fruit Growing

An ever-increasing importance has been lately paid by the population for the strawberry crop, RIFG Pitesti-Maracineni selling yearly great amounts of planting material.
However, all growers interested in this species, should know that for producing healthy fruits, the planting yield potential is much influenced by the health condition of plants. That can be disturbed into a certain extent by phytopathogens: viruses, bacteria, fungi and also by pests: nematodes, mites and insects.
The major losses in the strawberry crops are caused by the pathogens: Botrytis cinerea Pers., Phytophthora cactorum Leb. et Cohn. Schrot, Mycosphaerella fragarie Tul. Lindau, Sphaerotheca macularis (Wall. Ex Fries) Lind. and by the pests: Otiorhyncus sulcatus Fabr., Tarsonaemus fragariae Zimm., Anthonomus rubi Hrbst.
The Plant Protection Laboratory within RIFG Pitesti - Maracineni, tried along the years a great number of chemical and biological products (fungicides, insecticides, acaricides, nematocides, some of them being registered and recommended to the small and big strawberry growers.
A special concern was given to the selection of pesticides applied before harvesting because they should have a small remanence, as the fruit are shortly consumed.
Another objective in strawberry crops was the identification of the specific pathogens and pests, study of their biology, ecology and control.
Also, there are settled the integrated management control systems for the strawberry crops in the field, plastic tunnels or runners nurseries.
There were found some fungal microorganisms antagonic to Botrytis cinerea Pers. and bioproducts to prevent and control this disease were produced.
Important achievements were recorded in virus free plants production. Yearly, by the tissue culture, initial virus free plants are produced, used for the propagation of the basic and certified material.

Project head: Mihail COMAN , Senior researcher .
Study of germplasm fund, breeding of strawberry cvs.Organization of experimental modules with newly breeded cultivars for zoning the strawberry cultivars in Romania.
Technologies for ‘‘in vitro’’ propagation of strawberry cvs.Extension of management in strawberry cvs. Participation to European projects with strawberry species.
Mihaela SUMEDREA, Senior researcher
Bio-ecological study, symptoms and control measures against the pests and pathogens in strawberry plantings.Integrated control management of pathogens and pests in the strawberry plantings by utilization of phitopharmaceutic products accepted in EU.
Dorin SUMEDREA , Senior researcher
Adaptation of fruit plantings including small fruits and strawberry to meet the sustainable agriculture needs by integrating the technological sequences specific to the organic

production.Implementation of technologies for establishment and management of strawberry crops in the private fruit farms.
Cristian Florin MARIN, Senior researcher
Response of the new genotypes to the specific pathogens and pests; their economic importance in the strawberry crops.Studies on the biological and economical efficiency and ecological impact of the new phitopharmaceutic products in order to be registered and to be used in pathogens and pests control in fruit trees, small fruits and strawberry plantings.
Catita PLOPA, Senior researcher
Strawberry plantings management.Production of nursery stock of superior biological categories.Investigation with regard to PCR molecular techniques for the viral tests.

Description of RISA-ICPA ,National Research and Development Institute for Soil Science, Agrochemistry and Environment Protection- ICPA Bucharest

RISA-ICPA was founded in 1970 within the Academy of Agricultural and Forestry Scinces (ASAS), by grouping several departments, previously included in different structures.
The mission of RISA-ICPA is to promote basic, strategic and applied research, survey and longterm monitoring in soil and agrochemistry fields. This mission implies high quality contribution in developing knowledge on soils and environment. In the same time, trained scinentists and engineers are involved in providing services, there by contributing to the economic competitiveness of Romania, and to upgrading the quality of life.

Several strategic aims support this mission:
-nation-wide inventory (classification, mapping) and quality monitoring of the soil as natural basic resource;
-fostering research for a deeper understanding and a better prediction of different processes implying soil, land and plant nutrition;
-collecting, interpreting and supplying data on soil, land and plant nutrition;
-developing research for a better knowledge of the pedogenic processes and a sound understanding of the soil biofunctions in natural and anthropizer ecosystems;
-providing objective and independent expert advice;
-developing and using new technologies, as well as maintaining scientific facilities;
-ensuring linkage with user community and effective know-how transfer;
-traning and maintaining a skilled staff (“centre of excellence”)in soil science, agrochemistry and related fields (environment, GIS, RS, modeling, DSS, etc.);
-encouraging public understanding of soil and environment, by dissemination of information on human impact.
Project head *:Sorin Matei*, Senior researcher. *Skills:* Soil microbiology, bioinoculants, physiological processes in degraded soils, pollution control, bioremediation, physiological groups of microorganisms in agricultural soils, ecological agriculture, laboratory and green house experiments. *Role in the project:* research on soil respiration under various environmental stress conditions and strawberry cultivar, assessment of the influence of strawberry culture technology on the evolution of soil microbial biomass, selection of microbiological parameters for characterizing the equilibrium between beneficial microorganisms and pathogens in soils, statistical analysis.
Gabi-Mirela Matei, Senior researcher. *Skills:* Soil microbiology, fungal microflora (saprophyte), plant pathogens, biocontrol of plant pathogens, microbial antagonism, bioinoculants, ecology of fungal communities, mycorrhizae, ecological agriculture. *Role in the project:* laboratory tests of microbial antagonism, assessment of the influence of alternative technology for strawberry culture on fungal microflora, monitoring of the saprophyte/plant pathogen ratio in soil and strawberry rhizosphere under normal and stress conditions for evaluating the efficiency of biocontrol measures proposed by alternative techonology.

Nineta Rizea, Senior researcher. *Skills:* Soil chemistry, agrochemistry, soil pollution, environment protection, impact studies. *Role in the project:* agrochemical characterization of soil types from experimental and demonstrative fields, monitoring of chemical characteristics of the soil under nutritional and water stress.
Elisabeta Dumitru, Senior researcher. *Skills*: soil physics, soil compaction, the optimization of culture technology for improving soil physical properties in sustainable agriculture systems. *Role in the project*: physical characterization of soils from experimental and demonstrative fields, assessment of the influence of alternative technology on main physical properties of the soil.
Ion Seceleanu, Senior researcher. *Skills:* pedology, ecopedoclimatology, geography, studies of impact of various technologies on agricultural soils. *Role in the project:* pedological characterization of soils under the strawberry culture.

Description of IRAERD, Institute of Research in Agrarian Economics and Rural Development

Research works carried out by the Institute of Research in Agrarian Economics and Rural Development consist in the analysis, synthesis and capitalization of technical research results in agriculture and food industry.

The institute develops research-development activities in agrarian economics and rural development, in the following fields:
-economic evaluation of agricultural resources; farm management;
-technical-economic substantiation of the technical progress in agricultural production; economic improvement of production technologies and rendering agricultural production profitable;
-economic – financial mechanisms and key factors in stimulating agricultural production;
-integrated informatic systems for monitoring the main technical, economic and financial indicators of the farm;
-farm produce market; agricultural marketing;
-quality management in farm produce chain according to EU requirements;
-feasibility studies and business plans; economic-financial analyses at farm level;
-social-economic size of complex and sustainable development in rural communities, based on surveys, studies and analyses.
The team appointed to carry out the project consists in five research workers, highly experienced in agrarian economics and proving skills in the following fields:

Project head *:* Adrian Turek , Senior researcher
management of financial, material and human resources, by farm types, according to sustainable agriculture requirements;
use of multi-criterial analysis to improve agricultural production;
designing of farms of economically viable size, according to favourable zone and agricultural production structure, under productivity and efficiency conditions;
solutions for an incresed competitiveness in agricultural produce chain.
Prof. Petru Săbădeanu, Senior researcher
business plans for establishing new farms, in order to have access to European and domestic funds;
economic and financial management at farm level;
economic-financial analyses on farm modules;
quality management in agrifood product chain;
Magdalena Turek, Senior researcher
diagnosis analyses and drawing up scenarios of farm development;
studies of CAP impact on farm economic performance;
promotion of alternative activities, capable of offering new jobs and additional income to the rural communities;

Dan Veverca, Senior researcher
technical-economic substantiation of agricultural production technologies;
economic effect of new technical progress elements used in low consumption technologies, as well as of technologies specific to organic produce;
economic improvement and evaluation of technological inputs used to obtain agricultural produce;
administration and functioning of agricultural market;
Ec Dan Catana:
drawing up incomes/expenses budgets by products and farms;
analysis of farm economic performance, by using Standard Gross Margin;
technical-economic substantiation of best sized farms.

2.3 Consortium as a whole:

1. Biophan, coordinator and partner, RTD organization, with full private capital (mainly in agriculture). Its R&D activity is directed to an applicative research and technological transfer with the full-filment at the farms level.
2. USAMV, well known University, provides the scientific assistance with special concern on the major applicative research, scientific co-operation and technological transfer.
3. RIFG, RISA-ICPA, IRAERD, RTD organizations, financed entirely by the Government with a long experience in the agricultural areas.

The project manager, scientific co-ordinator and senior researchers (Biophan staff) have worked and got experience in RTD governmental organizations.
They chose a complementary RTD activity, in the private field. Co-operation between the partners in the present consortium, since 2004, has demonstrated the complementarity between partners.
Particularly, Biophan was emphasized in the consortium by: the direction to a private agriculture, as the Eastern European pattern in its beginning stage or the Western agricultural systems directed to the organic agriculture. In fact, Biophan links the structural RTD chain, which ha sat the top the University (USAMV), followed by the national research institutes (RIFG,, RISA-ICPA, IRAERD) and then small RTD enterprises like Biophan, Reaching Finally to the farm (sub-contracting parties which do the work in the experimental plots).
Sub-contracting parties within the project:
For the research activity:

1. GOËMAR Saint-Malo ,France (www.goemar.com), Goëmar has succeeded in transforming seaweed, a natural raw material, into a physioactive principle. Transformed by a process which retains the active principles of the Ascophyllum nodosum algae, GA 14 seaweed cream is the basis of a range of Goëmar biostimulants. It was made this contract to study the compatibility of biostimulators and Goemar plant protection products with the alternative technology proposed.

2. PhytoLab GmbH & Co. KG, Germany, (www.phytolab.com) Analytical procedures for plants, drugs and products made from these are among PhytoLab's key areas of competence and these include identification, purity testing and content quantitation.
There will be performed the biochemical analyses of the biopesticide proposed and determinations of the pesticide residuals in soil.

3. Bucharest University Romania, Faculty of Physics (www.unibuc.ro). Analysis of free radicals in the black coal by Spin Electronic Resonance (RES).

4. Sub-contracting parties for the experimental work
In the agricultural farms, experimental plots will be organized to ease the technological transfer. The farmers will support the project by co-financing share for the experimental work and registration of the biopesticide proposed in the project.

2.4 Resources to be committed

In addition to the cost indicated in part A3 of the proposal and the staff effort shown in section 1.3 other major costs are: R-D equipaments whitch will be seperetely mentioned for each partner.

1. Project manager and P1 partner – Biophan ensure to the project
It's microproduction sector:
-The pilot unit has two distinct equipments: Alfa Laval: Extraction, concentration by criogeny in CO_2 atmosphere and growth of Penicillium sp. growth plant (250 l, digital system for parameters control: pH, temperature, rH, pressure, carbonic acid concentration, etc. and auxiliary equipment of fractioned separation in CO_2 inert medium;
-Vertical oven for the black and active coal production from vegetal remaining.
-Auto-lab. Equipped to measure and control meters and a medium conditioniing system during samples transportation;
-Plant production Lab. with performent equipment (ex: Microscope Automation System for Biocular TC 5500, Cambridge Technology Systems) ;
-Microproduction capacity satisfy the necessary of raw meterial for doing the lab, glasshouse and field tests;
-There are provided so the organic substances of vegetal origin for the phitosanitary treatament , active coal for the weed biological control, lavd a creage for the experimental lots and management systems;
From the resources grauted by Requested EC Contribution to Biophan it is planned to extend the drip irrigation system and :
-purchasing of glasshouse and germinator;
-purchasing of factory to produce the biopesticide proposed to be registred within this project.
From funds from RTD activity, Biophan will give 30% far R-D equipments.

2.USAMV, faimous university will put at disposal it's own Excelence Cent for sustainable agricultural proctices for the needed logistics in human resources
From funds from RTD activity, USAMV will give 30% far R-D equipments.
RIPG , having experience in the fruit culture, put at the project disposal the Plant Protection Lab. , experimental lots and higt skilled personal.

3.RIFG , having experience in the fruit culture, put at the project disposal the Plant Protection Lab. , experimental lots and higt skilled personal.
RIPG has got a great experience in the research area, especially weed control specific to South Muntenia area and particulary in herbicides testing.
The endowment of the RIPG partner coupled with the endowmentes that will be bought satisfy the projects requests

From funds from RTD activity, RIFG will give 30% far R-D equipments.

4.RISA-ICPA, Research Institute for pedology, agrochemistry and agrotechnology will provide yhe materical and human resources for soil research and measures for soil improvement applicable in the experimental lots of P1, P2, P3 and sub-contracting partners From funds from RTD activity, RISA-ICPA will give 30% far R-D equipments.

5. IRAERD will provides the needed logistic and human resources for the specific activity inthe marking packages.
From funds from RTD activity, IRAERD will give 30% far R-D equipments.

The material resources of project parteners are complemenrary :

- So, Biophan, RIFG, RISA-ICPA will provide the material resources for the applicative research;

- Biophan will provide the resources for the technological transfer and USMV, the resources fot the fundamental applicative research;
- IRAERD will provide the necessary resources for analyses,synthesis and capitalization of technical research results in agriculture.

Project financial plan has in view the resources needed according to the responsabilites of each partner mentioned in yhe working packages.
To achive the technical- scientific performance it will be grauted 30% of the eligible costs for RD equipments
The entire humen resources of the projet are as follows :
-Senior researcher : 28
-Junior researcher : 2
-Management economic : 3
P.R. officer: 1
of with: femele : 19 male : 15
of with by qualifications:
-Biology : 9
-Agronomy : 12
-Biochemistry : 2
- Biology- Biochemistry: 1
-Pedology : 2
-Managiment , economic Engineering : 4
- Economy : 3
-Philology :1
The material and human resources are situated at an optimal level to satisfy the requests in the execution process of the activities proposed and achieveing it's objectives: Alternative cultural technology of strawberry in a cultural system directed to the biological agriculture used in the temperate climate of Europe.

3. Impact

3.1 Expected impacts listed in the work programme

Expected impact within this project is focused on area 2.1.2. “Increased sustainability of production systems”. Call: FP7-KBBE-1-2-04” Reducing the need for external inputs in high-value protected horticultural and ornamental crops”.
Reducing the external inputs together with a lower glasshouse effects are the major indicators influencing into a great extent the working methods and techniques and the general framework of the project.
At the same time, the indicators mentioned are the parameters responsible for the technology performance as well as for the alternative technology itself.
With this regard, the project suggests to examinate the present technology for the strawberry crop:
finding the technological sequences high consuming external inputs;
findng the external inputs increasing CO_2 emission or other substances with glasshouse effects (for instance, methyl bromide) and the proposal for alternatives.
Evaluation of potential risks causing major disturbances if the external input not be used.

After choosing the optimum methods according to the performance indicators mentioned, the studied options will be selected, related to: biological quality of the products obtained using the alternative technology, reducing the cost related to the ration: quality/price demanded on the market.
To achieve the expected impact, it is necessary:

biological diseases and pests control in soil, which in exchange it should be produced and registered a biopesticide based on the total extract of green raw material of Tagetes patula plants synergically to the active antagonism of Penicillium sp. strains.
Transfer from the pilot plants (well established in the initial phase of the project) to the exploitation plants in the commercial farms (these technological parameters are close to those in the pilot plant).
Production of black coal from vegetal remainings in horizontal ovens from commercial farms.
Founding a special private organization in the plant protection field, especially for the strawberry sp. which will entirely deal with the strawberry protection needs.

In this case, Biophan natura naturans will extend the capacity of its own Laboratory of plant protection for being able to solve entirely the plant protection problems from the commercial farms.
Simultaneously, in the 2nd phase of the project and after its fulfillment, these responsabilities will be taken over by another private organization trained during this period.
In this way, one of the farmer's problem could be solved and at the same time the strategy of Biophan natura naturans regarding the private research will be achieved.
Finding partners in the commercial field which are interested in the research results for increasing their yields and profits.
The commercial farms and other collaborative enterprises must financial bysupport the future research activity from their own resources.
Therefore, this private financing source can continue the project funding from the governmental sources.
Establishment of 20 experimental plots in farms and small farms where the technology should be applied.
A special farm for producing strawberry runners empjoying to the alternative technology proposed providing thus, the plants for the commercial plantings.
By the measurable objectives of this project for ploy an alternative technology for the strawberry crop in the temperate climate zone of Europe, by involves a strategy to reduce the external inputs, the glasshouse effects and also the pesticide residuals in soil, the present project has an European approach and a strictly individual one at the national level.
The research work within this project is directed for reducing the external inputs and implicitly CO_2 emissions (see WP3 and WP4) require to be synchronized with the research activities in the national and international projects of the kind.
These problems about the gass emission with the glasshouse effects have become a great concern in EU countries.
Besides industry and traffic, the agriculture is another area which is greatly, responsible for the pollution (gass effects) by the external inputs.
In comparison to other areas which increase the amount of gass emission, the agriculture plays another role too: fixing of CO_2 by plants (if it is changed into carbon stored in soil) and being a part of the carbon natural cycle.

3.2 Dissemination and/or exploitation of project results, and management of intellectual property

The intellectual property in the present project proposal it will be exclusive a public property because the most funds are public.
The technology will be provided to the farmers having commercial plantings, who in return must financially support from their own resources the further research work transferring to Consortium private resources.
In this way, it will take place the research financial support from the private funds instead of public ones.
The success for the dissemination and exploitation of project results is substantially raised by the social impact thanks to the application of the alternative technology proposed, especially for the exploitation of local facilities.

Generally, the agricultural technologies involved the mechanization of the specific cultural practices which finally went to a less labour power in the agriculture. In he horticultural field, especially in the strawberry commercial plantings, there are still some specific practices which could not be mechanically performed. For instance, the strawberry picking requires a high volume of labour power.
In the EU countries, this matter in the agriculture is now solved by the great numbers workers coming from new accessed countries (Romania, Poland, Bulgaria).
Over one million of Romanians work in the agricultural field of countries, such as: Spain, Italy, France, Germany (strawberry and vegetables picking).
According to observations made by Biophan natura naturans, one can see that the professional training of people working in the agricultural field of EU countries is very differently: basic to high educational level.
In future, all these people would like to come back in their own country and start a business in agriculture (to initiate their own farms).
Therefore, "Biophan natura naturans" aims at introducing an alternative technology for the strawberry crop to be applied on various sized plots.
The farm type or the agricultural system required is directed to those farms meeting the Common Agricultural Policy. The present farms will be restructured on a sustainable agricultural sector will be developed.
There are needed specific subventions for these measures: "The farmers, who in the past 5 years used agricultural techniques unharmful for the environment in accordance with EU environmental standards".
The value of these subventions can not be higher than 600 € per ha for the annual crops, 900 € per ha for multiannual crops and 450 € per ha for other kind of crops.
Based on the declarations of persons questioned, the present technology of vegetables and strawberry crops is in accordance to EU norms but there is still the problem of plant protection.
In this case, the dissemination and exploitation of the project results will be simultaneously with the research work and trials in the experimental plots.
The pressure for the dissemination and exploitation of the project results will be gradually related to the present opportunities:
Great funds coming from EU to develop the agriculture and rural areas in the Eastern Europe.
Lack of the viable technologies under the present conditions of Eastern Europe (rather small acreages, local and climatic specific conditions)
Financial resources coming from the income of persons working in EU agriculture
Their interest to invest into a performant agriculture. Changing of mentality regarding the agriculture following the experience got while they were working in EU agriculture (Spain, Italy, France, Germany).
Private support granted by the European countries to the emigrants for coming backing their own countries.

4. Ethical Issues

We guarantee that there are none of the issues, listed at 4: Ethical Issues, from Guide for Applicants, Food, Agriculture and Fisheries, and Biotechnology, Collaborative project, Call FP-7KBBE-2007-1, are not applied in the present project proposal.