

# *First International Conference on “Biotechnology in Agriculture”*

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# First International Conference on “Biotechnology in Agriculture”

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**Abstract** The 1st International Conference on “Biotechnology in Agriculture” was held at the Agricultural University of Tirana, Albania, from the 22nd to the 23rd of April 2014. The conference was organized as collaboration between the Agricultural University of Tirana (AUT) and the Friedrich Schiller University in Jena, Germany. About 200 scientists from different countries presented their work orally or as posters covering the three main topics of the conference: plant, animal and food biotechnology. The conference included a field trip as well to the Experimental Didactic Economy Station and a Fish Farm, both belonging to the Agricultural University of Tirana. In this report, we describe the main topics of the Conference and a summary of talks and posters presented in different sessions. The main conclusions provided at the end of the activity, the

objectives for the future and a brief overview of the field trips and pre- and post-conference tours are displayed in this current report. Since the conference on “Biotechnology in Agriculture” was the first one organized in Albania and also an international one, it was of a great interest for the participants and also for the scientific community working in the biotechnology area. Therefore, one of the decisions made at the end of the conference was to hold similar conferences periodically, every two years, at AUT.

**Keywords** Plant and animal biotechnology · Food technology and safety · Field trip

## Introduction

The 1st International Conference on “Biotechnology in Agriculture” was held at the Agricultural University of Tirana, Albania, from the 22nd to the 23rd of April 2014 (Fig. 1a). The conference was organized as a collaboration between the Agricultural University of Tirana and the Friedrich Schiller University in Jena, Germany. About 200 scientists from different countries such as Albania, Germany, Italy, Kosova, Macedonia, Bulgaria, Austria, Poland and Taiwan presented their work orally or as posters. Information about the conference is available at the conference website (<https://sites.google.com/a/ubt.edu.al/ajas/>). An abstract book was published and distributed to all the participants in the conference and is also available on the website (<https://sites.google.com/a/ubt.edu.al/ajas/>).

The conference was not only attended by the authors who presented their work, but also by many master and PhD students from Albania. This was a great chance for them to obtain experience in presenting their data in front of a wide audience and to get the most recent scientific

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**Fig. 1** Conference Hall at the Agricultural University of Tirana, Albania, where the conference “Biotechnology in Agriculture” was organized. **a** Opening ceremony: (from left to right) PD Dr. Klaus-J. Appenroth (University of Jena, Germany), Prof. Dr. Anila Hoda (University of Agriculture, Tirana, Albania) and Prof. Dr. Ralf Oelmüller (University of Jena, Germany); **b** Prof. Dr. Fatos Harizaj,

Rector of the Agricultural University of Tirana; **c** Plant symposium, chaired by (from left to right) Prof. Dr. Bizena Bijó (University of Agriculture, Tirana, Albania) and Prof. Dr. Kai-Wun Yeh (National Taiwan University, Taipei, Taiwan); **d** Conference participants at the Conference Hall

information on biotechnology in the plant, animal and food fields.

During plenary sessions, participants presented their work covering the three main topics of the conference. On the first day, three parallel sessions were organized: plant, animal and food biotechnology. During the second day, in addition to the plenary sessions, a poster session was organized where about 65 poster were presented. The conference included a field trip as well to the Experimental Didactic Economy Station and a Fish Farm, both belonging to the Agricultural University of Tirana.

The conference was opened by the Rector of the Agricultural University of Tirana (AUT), Prof. Dr. Fatos Harizaj (Fig. 1b), who introduced the participants to the main mission of AUT, as a unique educational and research centre in Albania for agricultural knowledge in the broad sense. He mentioned the strong and good relationship of AUT with many other universities worldwide. Prof. Dr. Harizaj described different bi- and multilateral as well as international research projects, in which AUT is involved

emphasizing the importance of collaboration in the frame of international projects, that might help not only the promotion of scientific research, but also to increase the exchange of students, academic staff along with the acquisition of contemporary experiences.

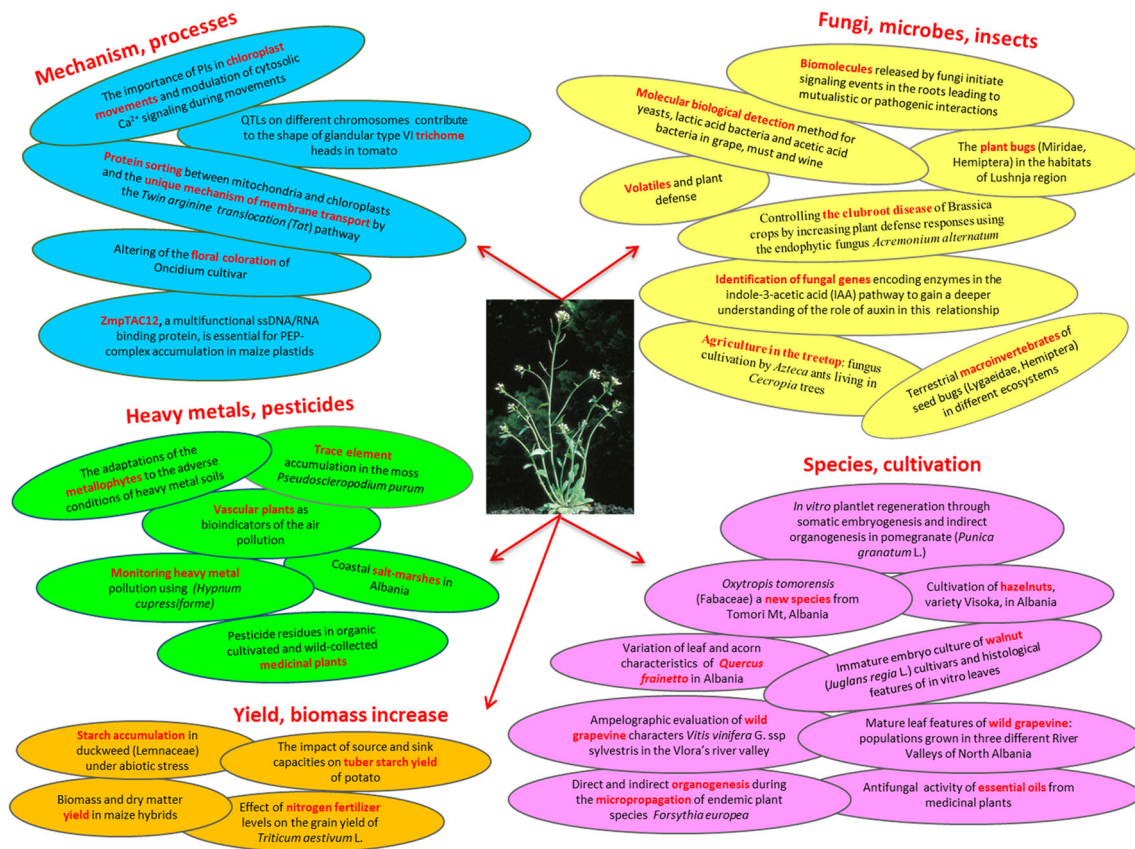
### Symposium 1: Biotechnology in Plants

The plant symposium was organized in four subsequent sessions: (1) Interaction of fungi, insects and microbes with plants, (2) Mechanisms and signaling processes in plants, (3) Yield and biomass increase of plants, heavy metals and pesticides; (4) Species and cultivation (Fig. 2).

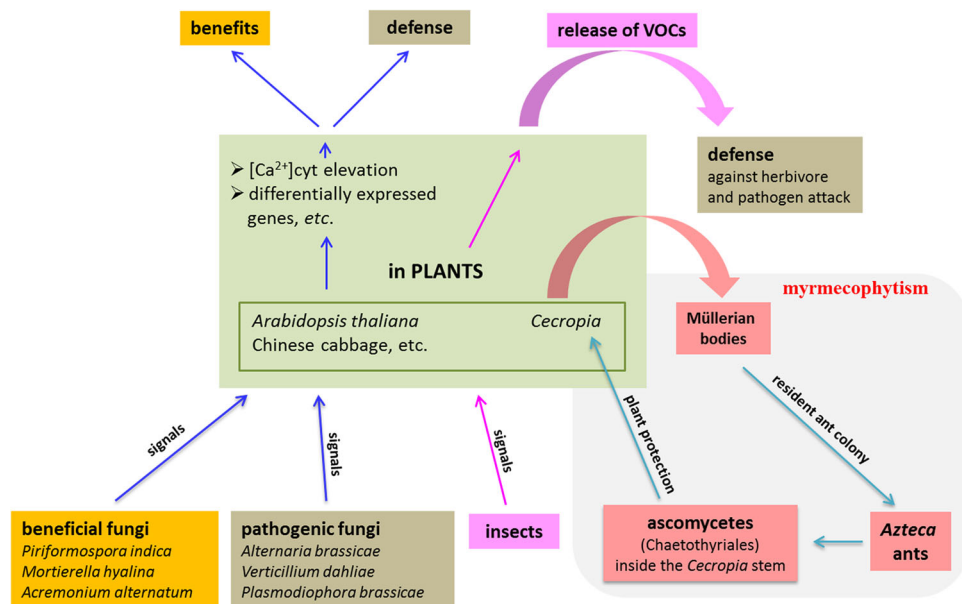
#### Session 1: Plant Interaction with Fungi, Microbes and Insects

This session focused on the interaction of plants with fungi, microbes and insects (Fig. 3). The first speaker, Ralf





**Fig. 2** Topics discussed in different plant sessions during the conference. The titles of individual presentations are shown in the ovals and can be viewed in more detail on <https://sites.google.com/a/ubt.edu.al/ajas/>



**Fig. 3** Schematic view of plant interactions with microbial, insects and fungi which were the focus of different talks at the Plant Symposium 1

Oelmüller from Friedrich Schiller University Jena, Germany, opened this session with a talk titled “Beneficial and pathogenic fungi in the rhizosphere: How do roots

distinguish?” He gave a progress report on signaling events that allow roots to distinguish between beneficial and pathogenic fungi in the rhizosphere (Fig. 3). The fungal

biomolecules activate receptors in plant roots and induce cytoplasmic calcium elevation in a phosphorylation-dependent manner. Transgenic *Arabidopsis thaliana* and *Nicotiana attenuata* plants expressing the calcium sensor aequorin were used to isolate and identify biomolecules from the exudates of the beneficial root-colonizing fungi *Piriformospora indica* and *Mortierella hyalina*, and from the pathogenic fungi *Alternaria brassicae* and *Verticillium dahliae*. Ralf Oelmüller introduced *Arabidopsis* mutants that do not respond to these biomolecules. Overall, this approach opens the possibility to distinguish between  $\text{Ca}^{2+}$ -dependent and  $\text{Ca}^{2+}$ -independent defense processes activated in plants in response to pathogens.

The second speaker, Jutta Ludwig-Müller (Technische Universität Dresden, Germany) focused on “Controlling the clubroot disease of Brassica crops by increasing plant defense responses using the endophytic fungus *Acremonium alternatum*”. She discussed the role of the clubroot pathogen *Plasmodiophora brassicae* which infects economically important Brassica crops such as canola, but also the model plant *Arabidopsis thaliana*. Her group has described the endophyte *A. alternatum* to show promising antagonistic effects in clubroot-infected *A. thaliana* and Chinese cabbage (Fig. 3) and conducted a microarray analysis to identify resistance genes which are differentially expressed. The long-term goal of this work is to contribute to a fundamental understanding of endophyte-plant interactions and an effective reduction of clubroot to be used in integrated pest management for canola and other cabbage varieties.

Axel Mithöfer from the Max Planck Institute for Chemical Ecology Jena, Germany, introduced “Volatiles and plant defense” highlighting the “scents of survival”. He introduced plants as master chemists that are able to synthesize an arsenal of different compounds that efficiently defend against herbivore and pathogen attack. Attacked plants can release characteristic bouquets of low molecular weight volatile organic compounds into their environment (Fig. 3). Mostly, these volatiles are terpenes and fatty acid derivatives. Taking advantage of results from his group and those from the literature, selected examples for defense strategies, defensive compounds, volatiles and their collection and analysis were presented. In addition, volatile-based approaches of plant defense in agriculture were demonstrated and discussed.

The talk title of Veronika Mayer from University of Vienna, Austria, was “Agriculture in the treetop: fungus cultivation by *Azteca* ants living in *Cecropia* trees”. She focused on myrmecophytism (Fig. 3), the obligate living-together of ants and plants. Although the *Azteca* sp./*Cecropia* sp. association has been known for a long time—the group of Veronika Mayer discovered only recently an additional partner,—the ants frequently cultivate

ascomycete fungi of the poorly known order Chaetothyriales (Ascomycota) inside the *Cecropia* stem. They isolated fungal strains from live and from silica-gel dried fungal patches and determined their identity with molecular methods. Only six closely related fungal genotypes were found in 42 plant individuals belonging to four different *Cecropia* species associated with five different *Azteca* ant species, and from different geographic regions.

Helmut König (Johannes-Gutenberg-University Mainz, Germany) described “Molecular biological detection methods for yeasts, lactic acid bacteria and acetic acid bacteria on grape, in must and wine”. The particular microbial composition and succession during winemaking has a great influence on the sensory and the quality of the wine. Therefore, it is important to reliably identify the involved species in a timely manner. This is also true for the starter cultures *Saccharomyces cerevisiae* and *Oenococcus oeni*, which are used for alcoholic and malolactic fermentation, respectively. Besides these starter cultures about 100 species of yeast, 22 lactic acid bacteria and 12 acetic acid bacteria were detected on the grapes, in must and wine. Helmut König introduced different molecular methods which allow for rapid and reliable identification and cell counting of microorganisms without prior cultivation. He focused particularly on a comparative sequence analysis of the ribosomal RNAs and the corresponding intergenic regions, fingerprinting methods such as the SAPD-PCR (specifically amplified polymorphic DNA), molecular probe techniques and mass spectrometric techniques such as MALDI-TOF-MS (matrix assisted laser desorption ionization time-of-flight mass spectrometry) which they are using for species and strain identification.

## Session 2: Processes in Plant Cells

This session focused on different processes within the plant cell. The first speaker of this session was Ralf-Bernd Klösigen from Martin Luther University Halle-Wittenberg, Germany, who spoke about “Specificity and mechanism of protein transport in plant cells”. In his talk he focused on protein transport mechanisms and the machinery involved in chloroplasts and mitochondria, organelles of prokaryotic origin that are situated in a eukaryotic cellular environment. As a result of this former endosymbiotic situation, the organelles house unique sets of protein transport machinery. Among those are evolutionary young transport pathways, which are responsible for the import of the nuclear-encoded proteins into the organelles, as well as ancient pathways operating, for example, in chloroplasts in the ‘export’ of proteins from the stroma (the former cyanobacterial cytosol) across the thylakoid membrane into the thylakoid lumen. The mechanism of such protein sorting and transport pathways are analysed in Ralf-Bernd

Klösgens' group by different in vitro and in vivo systems. He introduced two topics: (1) specificity of protein sorting between mitochondria and chloroplasts, and (2) the unique mechanism of membrane transport by the *Twin arginine translocation (Tat)* pathway which operates both at the thylakoid membrane of chloroplasts and at the cytoplasmic membrane of bacteria.

Halina Gabryś, from Jagiellonian University, Krakow, Poland, presented work on “Light signaling in plants”. She introduced her results on phytochrome control over germination and degradation of starch and lipids in seeds of tomato, *Solanum lycopersicum*. Phytochrome-deficient mutants (*phyA*, *phyB1*, *phyB2*, *phyAB1*, *phyB1B2* and *phyAB1B2*) are used to identify the specific signaling pathways in the phytochrome-signaling mutants. In the second part of her talk, Halina Gabryś focused on the control of chloroplast responses to light, in particular to determine more exact roles of secondary messengers in the signal transduction such as  $\text{Ca}^{2+}$  ions and elements of the phosphoinositide (PI) system. Her results demonstrate the importance of PIs in chloroplast movements, with the phosphatidylinositol 4,5-bisphosphate-phospholipase C pathway involved in blue light signaling by the phototropin PHOT2, whereas PI3-kinase and PI4-kinase are required for the PHOT1- and pPHOT2-induced accumulation response. PIs can modulate cytosolic  $\text{Ca}^{2+}$  signaling during movements.

Stefan Bennewitz from Leibniz Institute of Plant Biochemistry Halle, Germany, introduced “The shape of trichomes, a quantitative trait loci mapping approach”. Glandular trichomes are important “biofactories” for secondary metabolites with a wide range of functions in plant defense. Wild tomato species like *Solanum habrochaites* LA1777 possess spherical trichome heads, whereas the cultivated tomato *Solanum lycopersicum* exhibits a four-leaf clover shaped head. In both cases the head is made of four distinct cells. In the wild species, these head cells are separated by a cavity in the center, a feature missing in the cultivated lines. For investigating the genetic basis of these phenotypic differences Stefan Bennewitz created a back-cross population of LA1777 and *Solanum lycopersicum* WVA106. He demonstrated that there are at least four independent QTLs on different chromosomes that are contributing to the shape of glandular type VI trichome heads in tomato.

Kai-Wun Yeh from National Taiwan University Taipei, Taiwan, spoke about “Coloration in floral tissues of *Oncidium* cultivar”. Flower pigments composed of carotenoids, flavonoids and betalains are responsible for the natural attractive display of plant colors. Of the three pigments, anthocyanins of the flavonoid family, have the broadest distribution in flowering plants and are responsible for the versatile coloration from pale yellow to blue. In

his talk, Kai-Wun Yeh focused on the *Oncidium* Gower Ramsey hybrid which is a popular cut flower in the Asian floral market. Due to the multi-crossing in past breeding programs, the hybrid organism has lost its fertility. Therefore, no more color variations are generated in the progeny. The aim is to generate novel *Oncidium* cultivars with new pigmentation. For this reason they analyzed the pigment components in floral tissue and the differential regulation of key genes to determine the color pattern.

Jeannette Pfalz from the Friedrich Schiller University Jena, Germany, focused on “ZmpTAC12—a multifunctional ssDNA/RNA binding protein essential for PEP-Complex accumulation in maize plastids”. The plastid encoded polymerase (PEP) represents the major transcription machinery in mature chloroplasts. The assembly of this complex involves at least 16 subunits encoded by both nuclear and plastid genes. Depletion of single subunits is known to result in strongly diminished PEP activity causing severe defects in chloroplast biogenesis. She characterized one subunit in maize, ZmpTAC12, and investigated the molecular basis underlying PEP-deficiency in *Zmptac12* mutants and found that *Zmptac12* encodes two different isoforms, both of which localize dually to plastids and nuclei. Moreover, both variants assemble into the PEP-complex. Her data demonstrate that ZmpTAC12 is required for the stable accumulation of the PEP-complex and that it interacts with single-stranded nucleic acids.

### Session 3: Factors Influencing Plant Biomass

This session focused on two topics: (1) Yield and biomass increase of plants, and (2) Role of heavy metals and pesticides in plants. The first speaker of this session Frank Ludewig (University of Cologne, Germany) gave a talk on “The impact of source and sink capacities on tuber starch yield of potato”. To improve potato tuber starch yield, simultaneously both source and sink capacities are increased. Source capacity was increased by two alternative approaches, (i) cytosolic overexpression of an *Escherichia coli* pyrophosphatase in mesophyll cells and (ii) leaf-specific antisense repression of ADP-glucose pyrophosphorylase. Both approaches favor leaf sucrose synthesis over starch synthesis. However, without an enhanced demand of sink organs for sucrose, its transport via the phloem is not enhanced due to limited sink capacity. To overcome this limitation, an additional increase in sink capacity had to be engineered. To this end, two metabolite transporters in tuber amyloplasts, the pea glucose 6-phosphate/phosphate translocator GPT and the *Arabidopsis* adenylate translocator NTT1, which co-limit tuber starch formation in wild-type potato plants, were overexpressed.

Klaus-J. Appenroth from Friedrich Schiller University Jena, Germany, explained how “Increase of starch



accumulation in duckweed (Lemnaceae) under abiotic stress” is regulated. The question of whether growth is delayed because of inhibited photosynthesis was addressed. He exposed several duckweed species to stress such as (1) application of heavy metals, (2) application of salt (NaCl), or (3) lack of defined nutrients. Under all conditions, photosynthesis was inhibited to a lesser degree than growth. This became evident by detecting the accumulation of starch under these stress conditions: (1) use of heavy metals, (2) application of NaCl, (3) depletion of phosphate, nitrate or sulfate in the growth media. His results suggest that stress factors commonly suppress growth more effectively than photosynthesis.

Shukri Fetahu from the University of Prishtina, Kosovo, focused on “Biomass and dry matter yield in maize hybrids in Kosovo”. Biomass and dry matter of maize production per unit area are in full correlation to agro-ecological conditions during growth seasons and kind of cultivation. Information on silage maize yield and quality can help silage growers and users to choose hybrids that fit better to their needs.

Hermann Bothe from the University of Cologne, Germany, talked about “Heavy metal tolerance of plants”. The metallophytes occurring in Central Europe belong to different taxonomic affiliations. He focused on the toxicity of heavy metals to plant cell constituents and responses of plant cells to cope with an excess of heavy metals. Current research on heavy metal tolerance and hyperaccumulation of plants focuses on the two model species *Cardaminopsis (Arabidopsis) halleri* and *Thlaspi caerulescens*. On the molecular level, heavy metal tolerance of plants might have arisen by gene duplications and modified regulations of their expressions rather than the development of new genes generated by extensive sequence alterations. The identification of gene regions that code for the tolerance against a heavy metal is currently in the center of research in the field.

Smajl Rizani (Agricultural University of Tirana, Albania) described the “Influence of powerstation on water quality of the Sitnica river in Kosovo”. The purpose of the research was the investigation of Kosova A and B power station influence on the water quality of the Sitnica river. This research is focused on determination of the bonity grade of Sitnica water and the level of pollutants. Water samples were taken from 3 locations along the river flow and analysed for microbial infections. The author concluded that the water mainly belongs to the IVth and Vth grade of bonity.

#### Session 4: Plant Species and Cultivation

This session focused on new species, particularly in Albania and their cultivation. The first speaker, Lulëzim

Shuka from Tirana University, Albania, introduced “*Oxytropis tomorensis* (Fabaceae)—a new species from Tomorri Mountain, Albania”. In his talk, he described this new species, which was discovered recently in the limestone ridge of the Tomorri Mountain in southwest Albania. This species belongs to the section *Orobia* and has similarities to *O. korabensis* (F.K. Meyer), *O. prenja* (G. Back) and *O. argentata* (Pall.). *Oxytropis tomorensis* clearly differs from others by the habit and morphological characters such as semi-bilocular legume with well-developed dorsal septum, indumentum and size of leaves and leaflets, by 1-veined stipules.

In his talk “Nut trees in Drin’s valley, Albania”, Nazmi Ajazi, from the Ministry of Agriculture, Rural Development and Management of Water, Albania, highlighted nut trees as powerful plants with special botanical characteristics and a longevity of over 300 years. He studied the climatic profile of the Drin’s Valley, in which these trees are grown, and the influence of climatic changes on nut tree adaptation.

Lush Susaj (Agricultural University of Tirana, Albania) talked about “Mature leaf features of wild grapevine: Populations grown in three different River Valleys of North Albania”. Wild grapevine (*Vitis vinifera* L. ssp. *sylvestris*) is one of the most ancient and disseminated species in the riverbanks, forests and villages of the Northern Albania. An ampelographic and ampelometric study of the mature leaf characters was undertaken during the period 2009–2013 in three wild grapevine populations, located in three different river basins. Individuals of the wild grapevine populations belonging to the Mati River Valley, the lower part of Drini Valley and Shkreli Valley, were compared using IPGRI, OIV and UPOV ampelographic methods.

Vjollca Vladi from the Food Safety and Veterinary Institute Tirana, Albania, spoke about the “Determination of imidacloprid residues on tomatoes by high-performance liquid chromatography”. She introduced a simple method for the determination of imidacloprid residues in tomatoes which are grown under greenhouse conditions. Two procedures for extraction (acetone/ethyl acetate and acetonitrile/methanol) of the analyte from the sample matrix were suggested. Glass wool and Florisil column chromatography were used for purification of the sample solution. The technique used for detection was liquid chromatography equipped with an UV detector. LCMS was used as a confirmatory method. The recoveries ranged from 87.5 to 89.1 % for acetone/ethyl acetate extraction and from 92.4 to 95.8 % for acetonitrile/methanol extraction. Tomatoes treated with imidacloprid using the commercial insecticide formulation *Confidor* were analyzed using both procedures. The differences between the test results obtained by the two procedures were at the 5 % significance level. The acetonitrile/methanol extraction was recommended for determination of imidacloprid in tomatoes.

The next speaker, Elvira Bazina, from the Natural Resources Sustainability and Export Markets Development, Albania, focused on “Findings on genetic diversity in cultivated *Salvia officinalis* using molecular markers”. Albania continues to be a significant supplier of wild medicinal and aromatic plants to the world markets of which sage remains the major export item. Sage plants were randomly picked from different cultivation sites in Albania (North/Koplik, Southeast/Skrapar and South/Libohove) to screen for genetic diversity amongst them. The dendrogram showed splitting of the North cultivated sage from the Southern (southeast and south) group due to (dis)similarity in climate and soil structure/texture. Southeast cultivated sage plants exhibited some genetic diversity within the group. This study indicates that RAPDs were fast and easy to use and proved to be efficient discriminatory tools detecting a high level of polymorphism within the same species.

The last speaker of this session was Hasan Cani from the Ministry of Environment, Albania, who explained about “Eco-Physiologic—studies, an important tool for the adaptation of forestry to global changes”. In his talk he mentioned that forests are the dominant land use in Albania, occupying almost 1.5 million hectares. Different studies show a clear relationship between temperature and water relations and other factors affecting forest plant germination and growth that are often looked at separately. An integrated approach would provide the most comprehensive source for process-based modeling which is valuable to ecologists, plant physiologists, forest planners and environmental scientists. Actually, the Albanian vegetation is presented in two different appearances: on one hand, the existence of the virgin forests, generally located far from dwelling centers, because the lack of the infrastructure and, on the other hand, the existence of degraded forests, located near dwelling centers because of intensive harvesting, abusive cutting and growing.

## Symposium 2: Biotechnology in Animals and Humans

The second symposium covered a wide range of topics in the animal and human biotechnology field. The first speaker in this session, Anila Hoda, from the Agricultural University of Tirana, Albania, spoke about “Genetic diversity of Albanian goat breeds estimated by molecular markers”. She presented the evaluation of genetic diversity, genetic structure and genetic distances between six Albanian local goat breeds, using three set of markers: 31 microsatellite markers, AFLP markers based on three primer combinations, and 26 SNP markers. This research was carried out in the frame of an ECONOGENE project. The study shows a poor variation among the goat breeds. The

results were a reflection of goat management in Albania. Anila Hoda concluded that Albanian goat breeds are important reservoirs of genetic diversity, have a low level of differentiation and high level of admixture.

Bajram Berisha (Faculty of Agriculture and Veterinary, University of Prishtina, Kosovo) reported on a collaborative project with the Physiological Institute of Weihenstephan, Technische Universität München, Freising, Germany, entitled “Angiogenesis—the most important regulatory event for bovine ovary function”. Angiogenesis, the development of the new capillaries by endothelial cell proliferation and outgrowth from pre-existing vessels, is one of the prominent features of follicle finale development and corpus luteum (CL) formation and function. Of the numerous promoters of angiogenesis that have been identified, the most important factors appear to be vascular endothelial growth factor (VEGF), angiopoietin (ANPT) and hypoxia-inducible factor (HIF) family members. The author intended to characterize the expression patterns of these angiogenic family members in the bovine ovary during different physiological stages. Therefore two experiments were carried out. The examined factors are involved in the local mechanisms regulating angiogenesis as the most important regulatory event for follicle development and for CL formation and function in cows.

Festim Shytaj, from Ministry of Agriculture, Rural Development and Water Administration, Tirana, Albania, presented “The effect of combined preparation, probiotic and phytase on performance parameters and vitality of weaned piglets”. A combined preparation with probiotic Schaumalac F 80M BONVITAL 4b 1841 ( $2.5 \times 10^{10}$  KBE *Enterococcus faecium* DSM 7134) and phytase was supplemented to a basal ration with 4 %. The effects on growth performance on 35 weaned piglets were studied for 30 days. The results indicate that the combined preparation may be less suppressive to *E. coli*. They observed a positive effect of the probiotic and phytase on growth performance.

Hysen Bytyqi from the University of Prishtina, Kosovo, described a study on “Somatic cell count of Kosovo bulk milk farm management and perspective”. The aim of this study was to determine the effects of the somatic cell count (SCC) in bulk milk farm management and its commercial perspective according to milk quality standards in Kosovo. Over 2,000 raw bulk milk samples were taken from milk collection points in 4 regions of Kosovo, with two months visits throughout a year. All samples were analyzed using “Fossomatic Minor” equipment. The effect of SCC on raw bulk milk was used to obtain a general linear model. These results indicate a negative farm profit correlation, poor animal health and food safety and can be used for assessing raw milk quality and controlling herd management programs.

Xhelil Koleci (Agricultural University of Tirana, Albania) showed “Preliminary results of sero-conversion of kids and lambs vaccinated with *Brucella melitensis* Rev-1 strain”. Sheep and goat brucellosis is an endemic and most infectious disease of livestock in Albania. It continues to remain a frequent zoonotic disease and an important public health issue. Albanian veterinary services supported by the European Union-funded PAZA project (Protection against Zoonotic diseases Albania) applied two successive annual mass vaccination campaigns that aimed to vaccinate all small ruminants in the country. These two campaigns aimed at significantly reducing the disease spread, however, a small number of infection foci could remain and persist in some parts of the country. Post-vaccination surveillance is essential for early detection and proper control of cases of brucellosis that might re-emerge. The aim of this study was to evaluate the proportion of vaccinated animals that showed sero-conversion and the duration of detectable levels of agglutinins (antibody) against brucellosis in vaccinated animals.

Eglantina Xhemollari, from Agriculture University of Tirana, Tirana, Albania, spoke on “Serum enzyme and hepatic changes in sheep infested with *Fasciola hepatica*”. *Fasciola hepatica*, also known as sheep liver fluke, is a parasitic flatworm of the class Trematoda, phylum Platyhelminthes that infects the liver of various mammals, including humans. Fasciolosis is a parasitic disease of sheep caused by *Fasciola hepatica*. It has a worldwide distribution and it causes significant morbidity, mortality, liver damage and loss of weight. This study provides evidence for the presence of the parasite in the liver of sheep and biochemical values for 26 sheep samples which have been infested naturally from the *Fasciola hepatica* parasite.

Mimoza Kuçi from the Hospital Center of Elbasan, Albania, focused on “Hyperlipidemia - a potential risk for cardiovascular diseases in the population of Elbasan”. In this study the role of hyperlipidemia in atherosclerosis and cardiovascular diseases and links between high levels of lipid profile and the habit of smoking, family history with dislipidemia, diabetes and obesity was analyzed. A sample population consisting of 500 persons from the Elbasan district, selected at random, was examined. The blood samples were examined for levels of triglycerides, total cholesterol, HDL-cholesterol and LDL-cholesterol.

Kastriot Belegu from the Agricultural University of Tirana, Albania, explained about “Albanian consumer's perception towards animal welfare”. The strategy of the European Union for Animal Protection and Welfare 2012–2015 focusing on animal breeding for economic purposes aims to increase or guarantee animal welfare during breeding, transportation and butchery. The purpose of this study was to assess the level of knowledge that consumers have in relation to animal welfare as well as

their perception of the current situation of animal welfare in Albania. At the same time, the results of this survey will also contribute to a strategy for increasing the consumer's level of awareness on animal welfare and the impact of animal welfare on human life.

### Symposium 3: Biotechnology in Food

Various examples of how important the control of food is in terms of origin and/or contamination were presented and which methods can be used to achieve this goal. Anna Mottola from University Aldo Moro in Bari, Italy, talked on “DNA barcoding for species identification in prepared fishery products”. She explained that seafood mislabeling has been widely reported throughout the world and that the authentication of food components is one of the key issues in food quality. The aim of this study was to use DNA barcoding to investigate the prevalence of mislabeling among freshly prepared fishery products from markets and supermarkets located in Apulia, Italy. The study reveals a high occurrence of species mislabeling (42 %) in the prepared fillet products and provides further evidence that molecular investigations based on DNA barcoding would be one of the most powerful tools for the assessment of species identity, food traceability, safety and fraud.

In her talk “Occurrence of Norovirus and HAV in shellfish”, Valentina Terio from the Department of Veterinary Public Health, Valenzano (Bari), Italy, focused on norovirus and HAV which are common causes of gastroenteritis outbreaks associated with consumption of raw shellfish. The majority of norovirus infections worldwide are due to genotype II noroviruses. Instead, many studies describe a high prevalence of HAV subgenotype IB. A large number of bivalve molluscs (294 mussels, 42 clams and 33 oysters) from several retail points and harvesting areas “A” in South Italy, North Italy and Butrinti Lagoon (Albania) were sampled from 2008 to 2013. All samples were screened by a semi-nested RT-PCR specific for NoVsgeno group II and by a nested RT-PCR for VP1/2A region of HAV. Norovirus RNA was detected in 10.5 % of samples and ranged from 3 % in 2008 to 85 % in 2013. Instead hepatitis RNA was detected in 32.5 % of the samples and ranged from 90 % in 2008 to 3–1 % in 2013. This study contributes to developing new control strategies to reduce the risk to public health and also to monitor the epidemiology of the strains circulating in the field.

Marilisa Bottaro (University of Aldo Moro, Bari, Italy) spoke on her work entitled: “Detection of mislabeling in packaged chicken sausages by PCR”. This study investigates processed-meat products from Italian markets and supermarkets using the mitochondrial *cytochrome b* gene qualitative PCR identification system to verify any species substitution or mislabeling. The results revealed a high



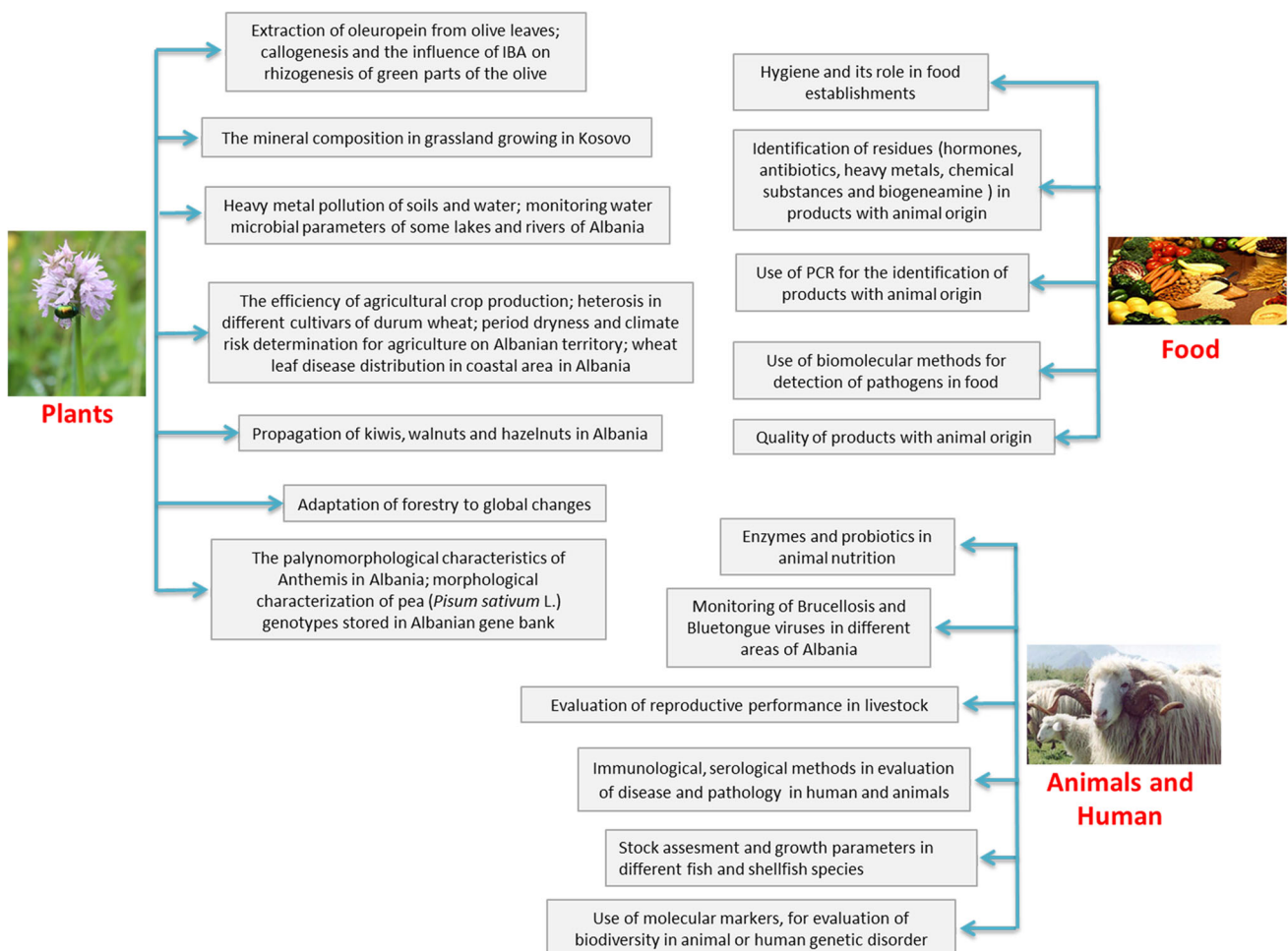
substitution rate among the packaged chicken sausages, highlighting a mislabeling rate of 54 %, and consequently, considerable discordance with the indications on the labels. This study also revealed important management implications, suggesting the need for implementation of effective and accurate monitoring and tracking programs.

Vinela Refugjati, from Grifin, Pest Control, Tirana, Albania, presented “Evaluation scheme for *Blatta orientalis* and *Blattella germanica* in food units with HACCP implementation”. *B. germanica* and *B. orientalis* are the most common insects found in the food industry, houses, offices, hotels, schools, and so on. The aim of this study was to evaluate the efficiency of 2.15 % imidacloprid gel baits for the two above mentioned species in Albanian food units. The obtained results indicate that 2.15 % imidacloprid gel baits are more efficient to eliminate *B. germanica* and *B. orientalis*, a safer way for humans and the environment compared to spray or dust insecticides.

In her presentation “Risk assessment of poultry slaughterhouses in Albania”, Rovena Jaha from Veterinary

Public Health, National Food Authority of Tirana, Albania, intended to assess the risk of poultry slaughterhouses to achieve better official inspections. This study was done in five poultry slaughterhouses in Albania. The study had two tasks: (1) poultry slaughterhouses classification related to the risk assessment based on the characteristics of the plant, product characteristics, production, hygiene processes, self-control plan (system of Hazard Analysis and Critical Control Points [HACCP]), and (2) the identification of *Salmonella* spp in the slaughterhouse environment and in the final products. The detection of *Salmonella* spp in poultry carcasses is based on the ISO 6579:2002 method. Twenty-five meat samples were analyzed in total, out of which only one sample showed the presence of *Salmonella* spp in 10 gr. These results are due to an inappropriate hygienic practice, manufacturing practice and demonstrate that HACCP is not implemented rigorously.

The title of the presentation of Renis Maçi, from Food Safety and Veterinary Institute, Tirana, Albania, was “The concentration and frequency of *C. sakazakii* in Queen



**Fig. 4** The most important topics presented in the 65 posters in the fields of plant, animal and humans, and food

Geraldine Hospital in Tirana". In the last years the International Commission for Microbiological Specification for Foods has ranked *Cronobacter sakazakii* as a "severe hazard for restricted populations, life threatening or substantial chronic sequelae or long duration" (ICMSF 2002). The objective of this study was the control of the kitchen environment at the University Hospital of Obstetrics and Gynaecology "Queen Geraldine" where powdered infant formula is prepared. The samples, 40 environmental samples and 20 hand swabs, were collected from the hospital kitchen and *C. sakazakii* was observed in two environmental samples.

Musa Dibrani (Isa Boletini University, Mitrovica, Kosovo) spoke about "The mycotoxins in foods from livestock origin and consumption risks". During daily life, food for animals are contaminated at different scales by mold, spores and mycotoxins. The dangerous mycotoxins are: aflatoxin, okratoxins, zearalenones, T-2 toxin, fumonisins. The aim of this study was the identification of aflatoxin in the products from animal origin, which was done in two periods, from February to April and from September to October 2013. The results demonstrated that the concentration of aflatoxin in some food samples was 25.3 µg/kg, which is higher than the allowed rate (20 µg/kg). The same topic was the focus of Valmire Voca (Isa Boletini University, Mitrovica, Kosovo) which was titled "Aflatoxin residues in milk and the effects on public health". She explained that the residue of mycotoxin, and aflatoxin in food is dangerous for public health and that routine control of food for the toxic residues is important, especially in milk products.

Bahtir Hyseni from Public University of Mitrovica, Kosovo, spoke about "Heavy metals in the raw milk in Mitrovica". The aim of this study was to measure the heavy metal concentration in the raw milk in Mitrovica, a region with rapid industrial development, and to understand the role of food contaminants. The results demonstrated milk contamination with lead, the highest concentration of this heavy metal was detected during the summer (LV = 2,048 mg/l). The concentration of zinc, one of the essential metals in milk, was reduced to ZD = 0,15 mg/l during winter time. The concentration of cadmium was high in all areas, reaching the highest level (BV = 0,12) in the summer.

The last talk of this symposium, "Quality of meat products in Tirana" was from Ermelinda Nexhipi, Institute of Food Safety and Veterinary, Tirana, Albania. Foodborne diseases play an important role in public health, because they cause not only infection to consumers, but also considerable economic problems. In this study three meat product categories were tested: salami with thermic preparation, salami with fermentation process and sliced packed meat products. Referring to the implemented system from

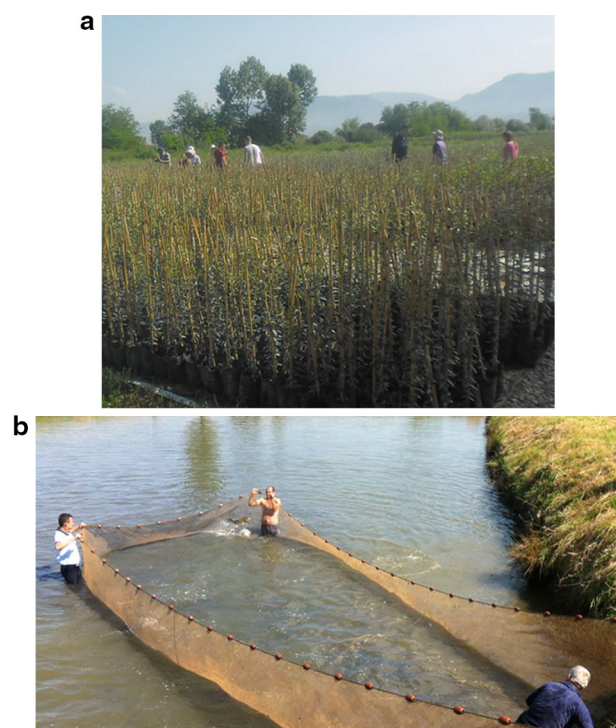
the manufacturer, Hazard Analysis Critical Control Point (HACCP), 7.5 % of positive *E. coli* samples belonged to subjects that implemented Good Manufacture Practice (GMP), 2.5 % others belong to establishments with an HACCP system. *Salmonella spp* was not determined. This study demonstrated the importance of the HACCP implementation system in the food processing industry.

## Poster Sessions

The Poster Sessions were well attended with over 80 participants. The sessions demonstrated a wide range of basic and applied research with a total of 65 posters covering the fields of (1) plants, (2) animals and human, and (3) food, corresponding to the respective lectures. The most important poster topics are presented in a schematic view in Fig. 4.

## Field Visits

During the conference a field trip to the Experimental Didactic Economy (EDE) station and the Fish Farm at Tapiza (both properties of Agricultural University of



**Fig. 5** **a** Experimental Didactic Economy (EDE) and **b** Fish Farm at Tapiza in Tirana, Albania. EDE is unique within the country and the most powerful field-oriented laboratory in which a series of experiments can be conducted in crops or farm animals. EDE and the Fish Farm are properties of Agricultural University of Tirana



Tirana) was organized (Fig. 5). EDE is the most powerful field-oriented laboratory in which a series of experiments can be conducted on food crops or farm animals, unique within the country (Fig. 5a). This economy has about 142 hectares of land, about 5 ha are used for fruit gene bank including 261 accessions of fruits, 100 of grapes, 40 of subtropical plants and 30 of olives. The center of Fish Farming in Tapiza is used as a natural laboratory for students of aquaculture and fisheries at all levels of studies. This unit has a terrestrial area of 5 ha in which the water surface is 3 hectares, with 25 basins (Fig. 5b). The main task of the center is to maintain the gene fund of cultivated fish types of Cyprinidae, such as common carp (*Cyprinus carpio*), bighead carp (*Hypophthalmichthys nobilis*), silver carp (*Hypophthalmichthys molitrix*), white amur bream (*Parabramis pekinensis*), grass carp (*Ctenopharyngodon idella*), goldfish (*Carassius auratus*), or koi carp (*Cyprinus carpio haematopterus*). Four additional green houses belong to the University campus with the following targets: fruit-tree growing, forestry and earth sciences.

## Pre- and Post-conference Tours

The Conference “Biotechnology in Agriculture” was a good opportunity for foreign scientists to visit different parts of Albania to learn about the history and traditions, but especially about the ecosystems, fauna and flora of the country (Fig. 6).

The pre-conference tours covered the Northern and Central part of the country. Daily excursions to Shkodra, Berat, Kruja and Durres were organized. Shkodra (Fig. 6a), located among the magnificent Albanian Alps, is the most important city in the Northern part of the country and famous for the Rozafa citadel and *Cyprinus carpio* raised in Shkodra Lake. During this trip a visit at the Faculty of Natural Sciences of Shkodra University was organized. The Dean, Prof. Dr. Adem Bekteshi, presented the scientific projects of this faculty. Berati, the 2,400 year-old city, located at the South-Central area, is also known as the “City of one Thousand Windows” and characterized by its white-painted houses with black windows. Pine forests



**Fig. 6** Pre- and post-conference tours included a visit at the historical town of Gjirokastra and Saranda, located in the Southern part of Albania. **a, b** Group photos during the visits at different historical

sites of Albania; **c** Historical town of Butrint in South Albania; **d** Different orchid species which grow in the Valley of Bistrica



above the city are characteristics. Kruja, located in the North-Central area at an altitude of 600 m, on the foot of Kruja Mountain, is historically of great importance for the Albanian. Skanderbeg, an Albanian nobleman living in the 15th-century, fought against the Turkish army led by the Sultan Mehmet for a quarter of a century. The restored Old Bazaar near the castle is a nice place to buy traditional Albanian clothes, carpets, jewelry and other items.

The post-conference tours covered the Southern part of the country. A 3-day excursion from Tirana to Saranda was organized (Fig. 6b–d). Gjirokastra, located in the Southern part of the country and known as “City of Stone”, was the first point of the tour (Fig. 6b). The castle of Gjirokastra is one of the most magnificent structures of the city and offers spectacular views of the Drino valley and the surrounding mountains. A visit to the University of Gjirokastra and discussions with the vice-rector, Prof. Dr. Liljana Reçka, were next on the itinerary of this tour. Butrint, a UNESCO World Heritage Site in South-West Albania was the next point to visit. It is one of the most remarkable archaeological sites of the Jonian Sea region. The archaeological site of Butrint is located within the Butrint National Park (Fig. 6c). Butrint Lake lies at the center of the Butrint wetlands and is rich in aquatic vegetation that serves as food for numerous fish species. Mussels have been produced in this Lake since 1968. Syri i Kaltër (Blue Eye) is a fascinating place itself and also known for its surrounding flora. It is a unique source for the Bistrica River, which springs out from a 50 meter deep hole with crystal clear water. Bistrica Valley, close to Saranda, is a nice place for botanical excursions and for its orchids (*Ophrys ferrum-equinum*, *Ophrys helenae*, *Orchis morio*, *Orchis laxiflora*, *Ophrys lutea* subsp. *Melena*, *Ophrys scolopax* subsp. *cornuta*, and *Orchis papilionacea*), some of which are shown in Fig. 6d.

## Conclusions

The meeting was terminated with some concluding remarks about how the conference concept was perceived by the participants and whether there will be a succession to this

meeting. Four topics were discussed by the participants and moderated by Helmut König (Johannes-Gutenberg-University Mainz, Germany) at the final session “Conclusions” of the Conference. (1) Present conference and outlook: The positive impression of the conference motivated the participants to propose to organize a Conference “Biotechnology in Agriculture” at an interval of 2 years. Future conferences will also take place at the Agricultural University of Tirana, Albania. The conference topics should include agriculture (animal, plant, food) and biotechnology. Students should be more intensively involved in lecture and poster presentations and there should be more time reserved for the poster presentation. (2) Publication of results: The summaries of the talks and posters should been published in an Abstract Book. Full papers about accepted conference contributions have been meanwhile submitted. They have been published in the Albanian Journal of Agricultural Sciences (AJAS) after peer reviewing in a special edition (for further information [https://sites.google.com/a/ubt.edu.al/rssb/biotech\\_plant](https://sites.google.com/a/ubt.edu.al/rssb/biotech_plant)). (3) Mobility: The mobility of the university teachers and students should be intensified by direct contacts between Albanian and non-Albanian universities. It would be advantageous to include students in ongoing international scientific projects to facilitate the preparation of theses. A responsible person at the student office of the Agricultural University of Tirana should help interested students to apply for grants in the frame of European or State student exchange programs (for example, Erasmus, DAAD, and so on). (4) Projects: Long term collaborations should be envisaged which should lead to jointed international scientific projects. The interactions between Albanian and other European Universities need to be intensified.

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