SUSTAINABLE CONSERVATION OF THE ALFAALFA'S NATIVE OLD VARIETY

NATIONAL CATALOGUE OF INNOVATIONS
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IDEASS – Innovation for Development and South South Cooperation

INTRODUCTION

By Asllan Celami

Cultivation of alfalfa in Albania two decades ago was supported almost on the Albanian ecotype “Tomin”. The total cultivated area reached about 60 thousands ha. Every year was sown about 15 thousands ha. The seed was produced from the 3-4 years old stands. The seed production was relatively low (about 150 kg/ha) and satisfied the needs for new seeding. The seed categories that were used were 15 % certified seeds of first generation, 30% certified seeds of second generation and the remaining 55 % were uncertified seeds. The mean green mass production of the ecotype Tomin in the national scale was 35 Ton per hectare, but in many cases it has demonstrated great potentiality which achieved 65-75 ton per hectare.

The panorama of the alfalfa cultivation in Albania has changed drastically in the last decade. The cultivated area nowadays is 140 thousands ha, the varietal structure has change in the sense that new modern varieties from abroad are introduced and the weight of Albanian ecotype Tomin in the new sowing of alfalfa decreased about 50 %. Certified seeds produced in Albania (categories of seeds) have dropped only 1-2 % the certified seed of first generation. The other quantities are uncertified seeds. On the other hand, production per hectare has reached about 200 kg/ha in a national scale. Many farmers and extension service reported cases where more than 500 kg/ha seed was produced

Implementation conservation program began in far past 2000 with an experimental phase and is undergoing a monitoring evaluation. Local Albanian old variety of alfalfa is estimated to be spread in a large scale in cultivated alfalfa surfaces. The variety is cultivated in the farms to produce green mass production for their animal feeding in one third of total area cultivated with alfalfa.

It was reported from different observations that Tomin alfalfa old variety, selected by recurrent population improvement method has good genetic characteristics for mass production in many region of Albania.

Annual production is estimated about 13-16 ton hay per hectare. It is adapted very well to soil conditions and agriculture management practices and stand persistence is more than 8 years. It is characterized by genetic variability for many economic characters and we may say without doubt that it is a valuable genetic pool for future breeding and cultivar development. Conservation program and sustainable economic use of this local variety are the main objectives of this study.

The general view of a farm seed Production field of alfalfa var. Tomin

The innovation, as it was conceived by the working group, deals at the same time with preservation of the biological and productive properties of ecotype (variety) Tomin for a given period of time, and the gradual improvement of these characters through the exploitation of genetic variability which is generated by population itself, from reproduction generations and seed multiplication under different climatic-sol and agriculture conditions. Some improved traits coming from innovation are the uniformity of vegetative and reproductive phases, persistence against humidity stress, and the vegetative period to some degree**.**

The sustainable conservation of old variety Tomin alfalfa through application of simple mass selection method for production of certified seeds is made only in Directorate of Agriculture Technologies of ATTC Fushe Kruja and about 3-4 tons certified seeds are produced every year. The innovation is property of Albanian government represented by ATTC Fushe Kruja.

Institution involved in the innovation contribute in different ways as follows: Ministry of Agriculture Food and Consumer Protection (MAFCP) finances the needed budget to produce the breeder seed category; NSI (National Seed Institute) monitors the implementations of production scheme, while the Unit of genetic and plant Breeding of Agriculture Faculty contributes with the consultations and alternatives for Selection scheme and traits which will be recorded and data statistical analyses. Other institutions involved are the Regional Agriculture Directorates of Fier, Dibra, and Shkodra Districts.

A general view of selection field and certified seed production

WHAT PROBLEM DOES IT SOLVE?

Conservation, management and sustainable economic use of native plant genetic resources is one of the strategic priorities of the national action plan on which the future of living human communities and development of areas where these resources are found will depend. But we must emphasize that these unique resources, for the value that they have, bear the risk of extinction if measures are not taken to prevent genetic erosion that they are suffering.

Given this situation, the undertaken research aimed at identifying the original of these alfalfa populations and to take necessary actions to in-situ conservation in order not only to stop the extinction but also to design and implement an in-situ conservation program, better management and sustainable economic use of these populations.

Natural conditions made the province economy development to be driven by animal products which meet most of the needs for human living. To support this tendency and especially cows for milk and meat production, Albanian emigrants had introduced new cultivated plants like alfalfa. It is documented that this crop is cultivated in Dibra and Gjirokastra regions at the end of ninetieth to beginning of twentieth century. Importance of this crop had grown in decades, and today it occupies about one third of agriculture cultivation land in Albania. This crop has also been adapted to natural conditions of these sites to a great degree creating new genetic characteristics appropriate for green and seed production under these conditions.

In the near past, about 95% of alfalfa fields was sown with these ecotypes, but unfortunately today is only 30-40 %. The significant decline in the cultivation area with these ecotypes is the result of:

- Lack of infrastructure for processing and marketing of seeds produced by farmers;
- Introduction of new foreign alfalfa varieties by trade companies of agriculture inputs,
- The decline of youth interest for agriculture farming,
- Lack of policies for preservation and development of genetic resources.

In the presence of good infrastructure of seed cleaning and conditioning, the innovation is profitable for farmers and national economy. There are very good environment conditions for seed production all around Albania and this is demonstrated by high level of seed production per hectare (mean national seed production is 300 kg per hectare).

There is much experience and there are many specialists which make possible the implementation of innovation in practice, the National Seed Institute, responsible for seed certification, Law No. 10416, date 07/04/2011 “On Sowing and Multiplying Plant Materials” and governmental decisions related to it, and the qualified staff of seed Production Sector of Agriculture Technology Directory in the Agriculture Technology Transfer Centre Fushe Kruje.

This innovation is ongoing only under supervision of ATTC of Fushe Kruja. The sustainable conservation through selection and certified seed production is done only in Agriculture Experimental Base of Fushe Kruje. The produced certified seed are sold to the farmers for forage or seed production. This kind of innovation is applied in other countries but only for their varieties and not for Albanian old variety “Tomin”.

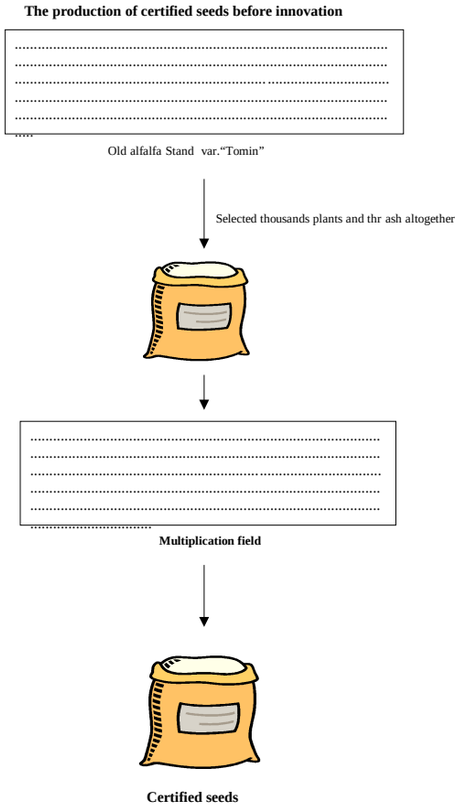
The renovation advantage is that it does not only conserve the genetic pool of the ecotype, but it also ameliorates gradually the valuable economical traits of this ecotype. According to the data collected so far, the cultivated aria with the Albanian alfalfa ecotype is about 45 thousands hectare. This proves the statistical data obtained all around Albania recently. The stand persistence in the farms is more than seven years with relatively good mass production in old stands. (these dates are provided by Extension Service). A quantity and quality product from Tomin alfalfa is very high. This comes as a result of the good combination of different morphological and biological characters. This old variety has good adaptability to dry condition without any sharp reduction in green mass production in summer period. Also it has a god persistence to rationally grazing. The production cost of alfalfa seed in farm, is relatively low because, it is produced from old stands which have been exploited through 3-4 year for forage production, without any special other input, except the phosphor top dressing. This innovation is capable of promoting soil protection from pollution and erosion also because the alfalfa is a perennial crop and requires a little or no chemical treatments for mass and seed production.

THE ALFAALFA CONSERVATION, IN PRACTICE

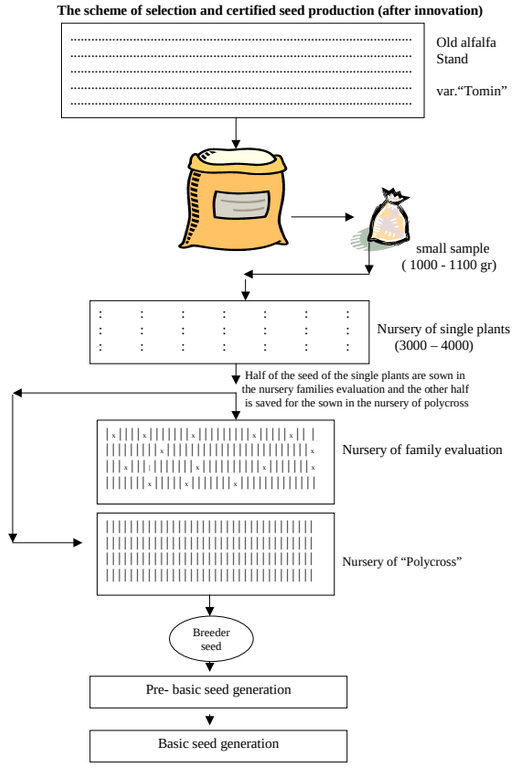
Thousands individual plants were selected before renovation based on their performance, the threshed together and harvested seed was sown to produce certified seeds category. After renovation a seed sample produced by mother field was used to implement the nursery of single plants. This nursery comprises more than a thousand plants which are evaluated individually for different economical traits. The best 25 – 30% of individual plants were selected and allowed to produce seed, the others were discarded. The selected plants were threshed individually and their seeds were sown in the next year in the nursery of family evaluation according to “ear to raw” scheme (each plant gave a family). After evaluation for one year or more the best families were selected that performed better than the others for mass production, uniformity, tolerance against the pest, rhythm of recovering after the

moving etc. The remaining seeds (half seed quantity of each family) were sown in the Polycross nursery to produce the breeder seed. In the next years the breeder seed is multiplied to produce the pre basic and basic seeds.

A comparison between the traditional (1a) and the innovative (1b). method is reported in Scheme 1.



Scheme 1a



Scheme 1b

Identification of old stands, sown with Tomin ecotypes, monitoring the performance and productivity of green mass and seed production of the field.

Phase I

Identification of populations, characterizing phenotypic populations of alfalfa “Tomin” area respectively in Fushe Kruja

Phase II

Monitoring of productive and reproductive performances of populations alfalfa ecotypes in their native sites.

Phase III

Selection of thousands of individual plants based on their performance, improvement and implementation of optimal advisory breeding which will serve as the parental to produce a new generation that is characterized by a higher genetic capacity, maintenance of genetic variability even in a some degree of inbreeding reduction in the plant population. This phase is composed of the follow actions:

The evaluation of single plant in the single plant nursery

- Development and implementation of in situ conservation program: The production system in which the population of local alfalfa are kept. Identification, evaluation and selection of parental plant generation that will serve for the reproduction on the natural conditions of “panmixie” based on productive and reproductive performance information etc.
- Develop and implement a plan for the optimal advisory (maintaining optimal effective size of the population, isolation distances from the adjacent other alfalfa field and other practices of cultivation for seed and mass production of alfalfa ecotypes) in order to ensure genetic variability and maintaining the inbreeding in an acceptable levels and ensure satisfactory genetic progress of populations
- Selection of fields for controlled natural reproductive of new seed generation.

- Study and improvement of production system.
- Encouraging the farmers of the area for the formation of the Association of Alfalfa farmers Tomin " to support the development, conservation and promotion of specific products in the local, regional and inter regional native alfalfa' ecotypes and the values that carries their genetic fund.

Phase IV

The evaluation and processing of all data collected in connection with different features values morph - biometrics, conformations, productive and reproductive performances.

The nursery of single plant evaluation

RESULTS

Experimental phase

Recurrent mass selection every 2-3 years has resulted in a preservation and amelioration of productive ability of the variety, preservation of enough genetic variability for further cycle of selection and improvement, and production of sufficient quantities of pre-based seeds (breeder's seed) for multiplication and production of first generation certified seeds.
In the national level, the innovation serves as a good base for initiations of Certified seed Production scheme and an evaluation of native genetic resources with economical impact on farmers' revenues.

Monitoring phase evaluation

The old variety "Tomin" has been tested for many years in varietal testing experiments in comparison with the new foreign alfalfa varieties introduced especially from Europe. The main demonstrated results of this innovation phase are high mass production ability, both in marginal environmental and agricultural conditions, a good stand persistence for more than 6 year if the stand establishment has been quite right with the plant needs, about 15 % more persistent and productive under stressed soil conditions, and more resistance against plant pathogens.

Economic results

The first economic result, the cost of production is about 1.8 Euro per Kg seed or half of the wholesale prices in EC (the wholesale price in EC is 3.5 -4.5 Euro per kg seed) so the net income is about 2.2 Euro per kg or more. According to new statistical data from Extension Service of AMFCP, the annual seed production from Tomin variety, in national scale is about 800 tons, which gives about 1.76 million euro.

The result of the innovation is that the variety is much more adapted to our climatic conditions and shows a high stability for mass and seed production and consequently many farmers require to sow this variety in their land. The economical impact of the innovation is of interest for farmers who will have a net profitability of 323 Euro per ha or in total 1760000 euro and the trade companies deal with the seed cleaning and selling of alfalfa seed. 1600 ton alfalfa seeds are produced every year. The cleaning cost of these quantities is about 450 000 euro.

TO KNOW MORE

following is a more exhaustive and in-depth documentation on the innovation:

- Asllan Celami Isuf Kaziu & al. 2004 Alfalfa
- Asllan Celami Isuf Kaziu & al. 2010 Manual of Alfalfa cultivation edited MAFCP
- Asllan Celami E Roço et al. 2009.Actual situation of PGRFA and challenges for the future: Case for forage and leguminous crops. In National Workshop The use of PGRFA aiming exchange information at National level Project "Strengthening sustainable use of plant genetic resources for food and agriculture in Albania TCP/ALB3102 (D) MAFCP/ FAO
- Asllan Celami, Isuf Kaziu, Adrian Doko. 2009. Cultivation Technology of local forage crops with emphases in alfalfa. Project "Strengthening sustainable use of plant genetic resources for food and agriculture in Albania TCP/ALB3102 (D) MAFCP/ FAO.

CONTACTS

The ATTAC of Fushë Krujë is available to provide technical support and innovation transfer to the interested countries. In order to establish collaborations, contact:

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