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KOSOVO NEW OPPORTUNITIES FOR AGRICULTURE PROGRAM

ASPARAGUS PRODUCTION TECHNICAL ASSISTANCE



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DISCLAIMER

This report was prepared by the New Opportunities for Agriculture project team of Tetra Tech ARD based on a Final Report prepared by Short Term Technical Advisor, John Casazza, a Farmer to Farmer volunteer. The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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BACKGROUND

USAID supports economic growth in Kosovo through programs that strengthen and improve competitiveness of Kosovo agribusinesses, improve the business environment, and encourage local economic development. Accordingly, USAID/Kosovo has awarded Tetra Tech ARD the task order for the New Opportunities in Agriculture in Kosovo Program.

The goal of the program is to increase economic growth in Kosovo through expanded, environmentally sustainable production and sales of value-added agricultural products by enabling producers and processors to compete regionally and globally. The program has the following components:

1. Products and farmers linked with markets;
2. Agriculture products diversified and increased;
3. Food quality and safety improved;
4. Increased affordable and accessible credits;
5. Improved coordination with the agriculture sector.

Asparagus fits the profile and goals of the program. It is a crop that offers an opportunity to diversify the current production scheme in Kosovo, bring in a new crop that has potential for the domestic as well as the export markets and it's a safe and healthy food additive to the population's diet. Planting asparagus will bring Kosovo in line with sixty-two other countries around the world that cultivate it. Even such neighbors as Macedonia and Greece produce asparagus so opportunities abound for the expansion and proliferation of the region's crop.

PURPOSE OF ASSIGNMENT

The purpose of this assignment was to monitor the Program's progress in the production and promotion of asparagus seedlings using UC 157 asparagus variety in Kosovo by implementation of two technologies – first, through production of greenhouse seedlings for the next year production of asparagus planting in spring 2012, and second, establishment of an asparagus production block using greenhouse seedlings to plant in late August early September 2011.

The Program has implemented this activity with three selected local nurseries that have the capacity to plant asparagus seedlings in greenhouses. The nurseries are geographically spread throughout the country to be able to provide growers information and inputs for asparagus production. This assignment contributes to the development of Program Component 2, Agricultural Products Diversified and Increased.

The Program had thought out the introduction of the new crop very well. Three top quality selections of asparagus varieties are included in the mix. Each offers unique characteristics and will be tested in the Kosovo environment to see how they perform. The decision to limit the nursery production to 30,000 seedlings each and then transplant one hectare per grower is adequate to get a good idea as to how the crop will grow out before expanding the following year to a greater area. It also allows the producers to test different techniques for fertilization, irrigation, and weed, pest and disease control. Farm sizes tend to be around five to ten hectares with production diversified to hedge against crop failures, market fluctuations and other risk factors. Including asparagus in the mix brings in a high cost but high value crop with a lot of potential for good economic success.

Asparagus is generally suited to Mediterranean types of climates but farmers around the world have adapted the crop to fit their own particular environment. Kosovo farmers have an advantage in that the regional climate is more similar to the Mediterranean climate but cooler thus driving the asparagus production towards the end of the regional season.

Knowledge of asparagus production is widespread and the team at New Opportunities in Agriculture in Kosovo has prepared well. It was important to verify the group's initial findings and fill-in the gaps with ideas as to how to upgrade based on asparagus production techniques around the world.

Producing asparagus in Kosovo will be a pioneering effort that will project the country favorably as one of the next agricultural exporters of asparagus to the European market while improving the availability and marketability of locally produced and imported asparagus.

EXECUTIVE SUMMARY

Asparagus, as a new crop in Kosovo, requires an analysis of the environmental and growing conditions to confirm its viability as a commercial crop. Assuming a positive analysis, there will be an introduction of new technologies related to asparagus agriculture.

Since there is little to no experience with asparagus in the technical support group of the New Opportunities for Agriculture Program, the volunteer provided expertise in cultural practices and operations, equipment, planting programs & techniques, soil preferences, mechanization, plant protection and fertilization, irrigation and weed control. Harvesting, packing and packaging, food safety and cold chain requirements will be addressed in later TA visits when the asparagus crop is available, before 2013. Technical advice was also provided on the nursery production of asparagus seedlings with three selected nurseries producing 30,000 seedlings each for planting to the open field in 2012.

The first requirement was to determine the adaptability of the crop to the weather regime of Kosovo. There was concern about the prolonged cold weather season delaying the initiation of the harvest season before hot weather comes around to cause a premature cessation of the season. However, favorable temperatures between late April to early May and June to early July make the asparagus harvest possible in these months. Rainfall is distributed throughout the year with irrigation supplementing the additional water requirement in prolonged period of low rainfall.

The second requirement was to determine the possible locations for field production. Two of the key factors are soil texture and soil drainage. Asparagus grows best in light soils, loamy sands to sandy loams with sandy clays and clay loams acceptable but less ideal. Clay soils are unacceptable for asparagus. Since asparagus roots can penetrate up to one meter, good drainage is required to create the soil environment appropriate for the harboring of asparagus fungal diseases. We visited three sites with three different soil and drainage characteristics. Of the three, the first site in Peja had the best soils with declining acceptability in the second and third sites, in Milosheva Village and outside of Pristina, respectively. Soils in the first site were sandy loam, the second site were clay loams to sandy clays and the third heavy clays.

Of the three nurseries contracted by Kosovo NOA, none had the same set-ups or growing environments. Growing mediums looked similar but fertilizers used were different. The seedling quality was very good and the germination above 90%. The growth of the seedlings were uniform and the color, except in some cases at one of the nurseries, was very good. Because of the good growing conditions, there was little scrutiny of the operations and processes.

Besides the nurseries and field sites, we visited a local supermarket carrying a wide array of local and imported vegetables, the local wholesale market, the Agricultural Institute in Peja and to see an actual commercial asparagus farm in Macedonia. Asparagus, as a crop, takes two to three years to get into production but once growing, it can produce commercially for eight to ten years.

FIELD ACTIVITIES TO ACHIEVE PURPOSES

Introduction

Asparagus is an ancient Mediterranean grass and is a member of the Liliaceae family of plants (lily family), now subdivided into the Asparagaceae family. It has separate male and female plants with edible shoots that later grow into a much branched, feathery, fern like frond with small leaf like needles called cladodes. *Asparagus officinalis*, as the commercial variety of asparagus is classified is a perennial crop which is productive for ten to fifteen years after establishment. It originated along the seacoasts of Europe and Asia and has been cultivated for over 2000 years. It was first domesticated and cultivated by Macedonians in 200 BC. Asparagus has also been depicted in ancient Egyptian writings and was grown in Syria and Spain in ancient times. There is a recipe for cooking asparagus in the oldest surviving book of recipes, Apicius's 3rd century "CE DE re coquinaria, Book III".

The prolifically cultivated vegetable is popularly consumed in many parts of the developed world and developing world. According to Brian Benson in his 2009 Update of the World's Asparagus Production Areas, Spear Utilization and Production Periods, there are at least sixty-two countries producing asparagus in the world with an estimated total area of 195,819 hectares. Major asparagus production can be found in China, the United States, Spain, the Philippines and Australia while Mexico and Peru have increased production to meet the continued demand from their importing countries. Green asparagus production in 2009 is up at 62% of the total volume with 78% marketed as fresh asparagus versus 57% green and 65% marketed as fresh in 2005. Domestic consumption of asparagus increased 4% from 53% in 2005 to 57% in 2009, and conversely worldwide export percentages decreased by 4%, from 47% in 2005 to 43% in 2009.

The popularity of the vegetable is generally attributed to the unique taste and to the symbolism of it arising first in early spring over other popular vegetables. There is also a growing realization of the health and nutritional aspect of asparagus as it is found to contain twenty-five (25) calories per serving of five spears and zero (0) fat, with no cholesterol or sodium, 1% of total carbohydrate and 8% of dietary fiber. It contains two (2) grams each of sugar and protein and of the daily recommended intake of essential vitamins and nutrients it has 10% of vitamin A, 15% of vitamin C, and 2% of calcium and iron. It also contains beneficial quantities of vitamin K and folic acid.

Field Visits

One of the first things that was clarified was the direction to plant asparagus to produce both white and green asparagus. There are difficulties and additional costs associated with white asparagus production and the trend is towards green asparagus production around the world and even in Europe, the prime market for white asparagus. The trend to green asparagus has to do with nutritional value as well as ease of production and harvest and ease of preparation favored by the younger consumer as white asparagus generally has to be peeled to permit the consumption of the succulent stalks.

The asparagus crop cycle and the production timing of asparagus spears was focused on. Seeds are planted in year zero (in this case 2011) in a greenhouse. They grow-out in eight to twelve weeks and can be planted to the field if given adequate time for summer growth. Unfortunately, the first batch of seeds planted in Kosovo was late arriving so not planted to the greenhouse until late summer. The group had already decided to transplant the seedlings into larger plastic bags to over-winter in the greenhouse before planting out in the open field in the spring of year one in this case 2012 which was agreed upon. The seedlings from next year's planting could actually be moved out of the greenhouse to the open field in May to grow during the summer, die-back in the winter, only to regrow fully in the spring of the following year. This is the direction the group decided to take and will double the new production area to six hectares for open field planting the summer of 2012.

The following day we visited the three greenhouses growing seedlings for the NOA Kosovo project. Luan Bucaj of Las Pallmas, Skander Ramadoni of Fidonishta Egodoncet and Gani Hajzeri of Agro Serra were met with. Seedling germination was above 90% in all three areas and the growth very uniform. This is a sign of good quality seed. The color was dark green except for some of the tips of the seedlings at Agro Serra. Since the chlorosis was at the tip, it was assumed that it was due to a nitrogen deficiency. However the reality of the situation was such that it was shade in the greenhouse that may have caused the yellowing. All of the nurseries were using Styrofoam trays but with different size cups for holding the seedlings, sterile greenhouse growing medium, multiple nutrient fertilizers, automated irrigation and no artificial light nor heating was necessary. The smaller cups would require a faster transplanting to the plastic bag due to restriction to the root growth. Many of the seedlings from the trays were popped out, and the seedlings, stalk and roots looked very healthy with the small crown forming nicely. The greenhouses have heat and if this becomes an issue during the winter, they will be able to take care so as not to lose the seedlings to any type of freeze. The crops are quite susceptible to freeze at an early age especially living in an enclosed environment.

The farm of Hivzi Aliu, Livoq Village within the Peja municipality who has a six hectare farm of his own and four more hectares he rents for a total of ten hectares was visited. His greenhouse with tomatoes and cucumbers, both which were at the end of their production cycles, were toured. As an observation, there were many diseased vegetables, plenty of trash and discarded fruit on the ground as a source of disease inoculum and not many people working to clean the bad product and trash or even harvest the ripe and ready product. There are twelve head of cattle he milks for the local market and which is a good source of manure. He had piles of the manure he was composting and to be spread prior to the next crop cycle. The corn and alfalfa he was growing for silage and hay. They were growing on a sandy loam soil, a soil ideal for asparagus production. He uses a flood irrigation system with water supplied by the local government. The water is clean with a low salt content and should be adequate for the asparagus requirement. His tractors and farm implements were observed. One row crop cultivator that could be used for making beds and furrows for the asparagus planting was available to this farmer. There were also some mowers and silage cutters that might be adapted for cutting the asparagus tops. The grower affirmed he was willing to plant a hectare of asparagus, and it is recommended that the NOA project move forward with this farm for asparagus plantings.

The Agriculture Research Institute in Peja is an impressive facility conducting research in many areas of agriculture. They have laboratory and analytical equipment for soils, plant tissue, microbiology, seeds and post-harvest of fresh and processed ag product. It's

recommended that NOA work with the institute to conduct soil samples and leaf nutrient analysis of crops under NOA's program and work to use standards apt for the farmers and technicians to understand.

The farm of Mohammed Ismoili in Milosheva Village was visited. He has three hectares with most planted to corn and two-thirds of a hectare available for asparagus. The corn looked very good with the ears of the large yellow variety fully filled out and almost ready for harvest. The soils were clay loam, sandy clay loam and silty clay loam by my observation and feel test, all suitable for asparagus but heavier than ideal. With the small area available to farm among the corn and potatoes being farmed in an adjacent field, it is recommended that NOA look for a better site to start the project and show farmers the proper asparagus growing techniques without the constant threat of weeds, disease pressure and the interference of all the other crops in the area. Available nearby was a bed former used in Holland for planting asparagus. It is a sturdy piece of equipment but the beds would be too close and narrow which would make it difficult to access for harvesting and future tractor work.



Mike Kimes & Ismet Babaj talk to Mohammed Ismoili in Milosheva Village about planting asparagus on his farm, currently planted to corn and potatoes.

One of the local supermarkets and Ena Wholesale Market was toured. The supermarket had a good presentation of fruits and vegetables but no asparagus. Quality looked good, a sign of good handling and proper cool chain. Osman Feifer, one of the principal buyers and sellers of local and imported produce provided beneficial data: He sells very little asparagus and if he does, it imported from Italy for 5 – 6 Euros per kilogram and only goes to restaurants and not to the supermarkets. He was interested in knowing about the local production and the opportunity to move it to the local market.

The 40 ha farm of Refik Slobani of Agroumon was visited. He grows corn and has a large intense production of apples. The soils are heavy clays with a lot of shrink and swell properties. The area going towards the river has some lighter components but is still too heavy for asparagus. During period of rain the area floods and drains were being put in to direct the water away from the field. The area shows some of the widest and deepest cracks in a clay soil. It is recommended that this area be excluded from the asparagus planting program due to the heavy soils. As an observation, the apples were from Serbia and probably not certified. There was a lot of rodent damage to the bark and in some places the trees were completely girdled. There was rodent poison out but the trees lacked wraps that would have been a safer and more effective control.



Potential Asparagus Area - The farm of Hivzi Aliu, Livoq Village within the Peja municipality. Corn fields among alfalfa and peas.

In order to understand asparagus in the region, a commercial asparagus operation in Kovaderci Village, Rosomon Province in Macedonia was visited. According to Cedomir Dimitrov, the agriculture manager, the farm has eighteen hectares of asparagus they've been harvesting for seven years. It is owned by a private company called Dusan Cirvic and they also farm three hundred hectares of peaches and two hundred hectares of wine grapes. There are signs of asparagus rust on the leaves and fusarium crown rot. The disease incidence is heavier on the heavier clay loam soils and around the poorly drained sites. According to the farm manager, the bosses denied the spray saying they had already harvested and that it would not benefit the crop. Unfortunately, next year's production will be affected because of the disease occurring during the grow-out and carbohydrate production in the crown. This is an indication of the hazard of planting in heavier soils. There was a fairly heavy crop of

weeds especially along the plant line. This is mainly due to the sprinkler systems they use for irrigation and the weeds that cannot be pulled during the harvest season. According to the manager, the yield is 3,000 kilograms per hectare that are then packed in the peach packing plant. The product goes to a Greek middleman and exporter and gets shipped to France for Euros 15 per kilogram.



Dusan Cirvic Asparagus Field, Eighteen (18) Hectares, Kovaderci Village, Rosomon Province in Macedonia

TASK FINDINGS AND RECOMMENDATIONS

The following tasks were derived from the Scope of Work provided by CNFA/USAID's Farmer-to-Farmer Program and from conversations with NOA staff working on the project.

Task #1 – Prepare a growing manual for basic Kosovo asparagus cultural practices for both white and green asparagus. The growing manual should include a planting guide, fertilization schedule, spraying schedule, recommended herbicides and cultural practices.

Task # 2 – Prepare a basic “how to” nursery manual for growing asparagus seedlings from seed plant care, irrigation and over winter greenhouse heating for open field spring transplanting.

Task #3 – Prepare crop budget for green and white asparagus to obtain cost of production figures and breakeven analysis to see how long the payback period will be for grower to recoup his investment.

Task #4 – Site selection of future asparagus open field production for transplantation from greenhouse to open field for spring of 2012 and recommendation for planting. Field layout planting design and spacing.

Task # 5 – Final report and recommendation or road map for next steps.

Task Findings

Task #1 – The growing manual for basic Kosovo asparagus cultural practices is specifically for green asparagus only. The group decided to forgo white asparagus production and concentrate on green asparagus production only. An explanation for not growing white asparagus was provided in a previous section.

There is a specific reason that fertilization or spray schedules were not provided. The fertilizer requirements for asparagus are based on soil analysis and leaf tissue analysis and can only be made once the tests are carried out. NOA has been provided with the names of sites and documents to consult with which will give them indications of fertility levels and then make a fertilizer plan based on the levels in the soil and crop. IPM and conventional spray techniques in a table attached to the asparagus manual are provided. A spray schedule needs to be developed by the farm managers based on the insect and disease pressures during the progress of the crop. An Integrated Pest Management (IPM) approach to insect and disease control is the best method. Actually, organic asparagus production would be a possibility if there were farmers with supplies of organic fertilizer and the knowledge of organic asparagus production. Copies of the lists of plants that attract beneficial insects have been provided to NOA Kosovo technical representatives and seedling nursery owners in order to give them ideas about which plants are grown around the fields, and which provide some IPM protection from plant pests.

Task #2 – A nursery manual for the project was not prepared, as the condition of the nursery seedlings were very good. It looked as if the nurseries were taking the right approach. The fertilizer or chlorotic condition of some of the seedlings and the recommended transfer to larger bags were made. Also, it is recommended to keep the plants in the greenhouse until the following spring to protect against cold winter weather.

The varieties of asparagus to include in the initial planting were discussed. The majority of the production will go to UC-157, a hybrid asparagus developed at UC Davis. It is the world's number one commercial asparagus variety and a good producer in many environments. The second variety is the DePaoli, another UC hybrid with some improved characteristics over the UC-157. The third variety is the Jersey Giant, an all-male hybrid developed at Rutgers University with characteristics suitable for cooler climates. This will be good to test under Ksoso conditions which are similar to the North Eastern United States. Knowing the climate regime in Kosovo, it might be prudent to test some Canadian varieties as well over the next couple of years.

Task #3 – An elaborate crop budget given the unfamiliarity with the growing conditions in Kosovo and the variability of the labor efficiencies, the material requirements, the equipment availability, the irrigation systems and the weed, pest and disease situations, was not created. This is something that is advised that the next FTF asparagus volunteer work on, as some of the preliminary work will be done beforehand.

Task #4 – Visited three sites for potential asparagus production. Out of the three sites, one was ideal, one marginal and the third site unacceptable. The key conditions for a suitable site are light soil texture with good drainage and access to clean and plentiful water for irrigation. The planting process was described and included in the production manual. Equipment requirements, methods for transplanting and covering the asparagus, timing of the transplants, spacing between rows and between plants and the techniques for maintaining the beds were given in the production manual. Further discussion on the sites will be considered below.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE ACTIVITY

1. Now that the nursery production of seedlings is going well, the group has to concentrate on site selection. The particulars about soil and topography and the planting and layout were discussed during the assignment, but other considerations are necessary to discuss. One of these is the packing and cold chain requirements. Given the limited area of soils with light textures and the low planting area of three hectares in 2012 and six hectares in 2013 It is recommended that the group look for planting sites within the same area round that of Hivzi Aliu, near the village of Livoq, Peja municipality. Consider the volume of harvest from 9 hectares, at 27 metric tons per year. There should be around 5,400 cartons of 5 kilograms per carton produced. Over a six week period this is 900 packages per week or 180 boxes per day. On the ends of the curves assume half of the daily amount or 90 boxes per day and double the amount, 360 boxes per day, during the peak. At the peak, the volume is 45 boxes per hour, a small amount to be packing. In Macedonia, the packing was being done in a shared facility. It is assumed there is one such facility in Peja that could be shared by the growers and used to pack product at a fixed cost for packing and cold storage and truck loading. Cost and revenues can be shared by the growers and reconciled at the end of the packing season. A single pallet hydro-cooler and a mini cooler or container cooler set up could be used for cold storage.
2. Start developing audio visual models of the asparagus production process and work with the potential growers and their technicians and workers to present the training model. Use current publications on asparagus production techniques, pictures from active asparagus production facilities, breakdowns of the soil features and determine the fertilizer and nutrient requirements and examples of weed control and pest and disease control to include as part of the training material. Eventually harvesting and packing will need to be included in the training. Use each of the farmers' sites as locations for the training.
3. Start developing a financial model based on seedling costs, land preparation and planting costs which are included in the activities that are being started in this year or coming up in the following year. Add weed control and fertilizer requirements, and pest and disease control as they come about. Eventually harvesting and packing will become part of the cost mix as well as fixed costs of supervision, capital depreciation and any costs associated with maintaining or paying for the land. Teach the farmers in how to maintain records of field activities and costs.
4. Develop a soils and tissue standards for asparagus and work with the local laboratories at the institutes and universities to assist the group and train the farmers and the technicians to interpret the results and develop fertilizer rates to match the requirements.
5. Start a cultivar trial and variety bank of asparagus cultivars from different locations. Keep records of the production, quality and marketability of the product for future reference and future expansion. The trial could be set up at a local university or at the Peja research laboratory to give it academic as well as commercial significance. This

could also be used as a model farm to provide the growers with techniques for modern asparagus production.

6. Start looking at locations for a packing shed and get plans for making a simple packing line. Site visits to Spain asparagus operations are planned and could be a good source of ideas. However, plan on bringing in engineers knowledgeable of asparagus packing equipment and cooling equipment associated with the asparagus that will save a lot of time and effort in designing the process and the equipment.
7. Investigate possible marketing channels including exports, potentially aligned with the Macedonian producers and for local markets through supermarkets or through the wholesale market. There is potential even with the low production. Not knowing the production cycles yet, there may be an overlap or an extension of the Macedonian season and a good opportunity for Kosovo asparagus to market internationally. Also, having asparagus in the local market will stimulate demand and possibly open up opportunities for imports in the off season.
8. Start promoting the initiation of asparagus production in Kosovo. This is going to be a historic event, the first harvest of asparagus, and the beginning of a tradition bringing back asparagus to the origin and region of its commercialization in 200 BC.

ANNEXES

Annex 1 – Contact List

<u>Name</u>	<u>Company</u>	<u>Contact</u>
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