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ALFALFA SEED MULTIPLICATION PLOTS

KOSOVO CLUSTER AND BUSINESS SUPPORT PROJECT



April 13, 2007

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ALFALFA SEED MULTIPLICATION PLOTS

THIS REPORT DETAILS THE SET-UP OF ALFALFA SEED PLOTS THAT WILL HELP TO ASCERTAIN IF PRODUCTION IS FEASIBLE IN KOSOVO AND DEMONSTRATE THE TECHNIQUES INVOLVED TO POTENTIAL SEED GROWERS

Kosovo Cluster and Business Support project: "Alfalfa Seed Multiplication Plots",
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CONTENTS

Purpose of Assignment.....	1
Background.....	1
Executive Summary	2
Field Activities to Achieve Purposes	3
Task Findings and Recommendations.....	4
Conclusions and Recommendations for Future Activity	6
Annexes	10

PURPOSE OF ASSIGNMENT

Based on previous local and regional market research, KCBS has determined it is justified and important to proceed with alfalfa seed multiplication trials in 2007.

The purpose of this phase is to explore the production economics and feasibility of alfalfa seed multiplication in Kosovo. Through this activity, KCBS would like to determine if it is possible for Kosovo to reduce imports of alfalfa seed by replacing some of them with local seed production in the future and economically produce alfalfa seed for regional markets.

The consultant would be expected to provide some training to local seed multipliers, the government, the Institute and Agriculture Faculty staff on specific production practices and the general organization and structure of the seed multiplication industry in the USA and/or the EU.

BACKGROUND

The Ministry of Agriculture, Forestry and Rural Development (MAFRD) indicates there is about 125,000 kg of alfalfa seed imported into Kosovo annually, or more than €310,000 using an average price of €2.5/kg. There is no import duty or VAT on alfalfa seed. KCBS believes it is possible to replace at least 25% of the imported seed over the next two years, resulting in increased sales for domestic seed multipliers, and a reduction of imports, by more than €78,000. Assuming profit margins at €0.50/kg, this would mean more than €15,000 in increased profit to seed multipliers. Adding alfalfa seed to the portfolio of seed multipliers will also reduce the overall risk to these enterprises.

These are conservative estimates to demonstrate the pay back on the investment assuming a static demand. However, the demand for alfalfa seed is expected to increase significantly as land ownership issues become resolved. Alfalfa is a perennial crop lasting 4 to 5 years once established. There is a high cost of establishment in the first year and hence there is a reluctance to make the investment on rented land. In addition, regional seed companies would potentially multiply alfalfa seed in Kosovo for the Balkan region, increasing the hectares for seed multiplication significantly.

There are only four major seed multipliers in Kosovo and they are currently focused on wheat seed multiplication. There is limited institutional knowledge regarding seed multiplication in general. Only one of the current seed multipliers, Semenarna, develops their own genetic material. They do this in Slovenia.

The consultant is expected to work closely with the local subcontractor in training it via specific instructions verbal and written. It will employ commonly used training materials to equip the subcontractor to fulfill its scope of work and to assist the subcontractor in understanding what is expected of him in this regard.

EXECUTIVE SUMMARY

This consultancy's main purpose was to design alfalfa seed production demonstration plots and train a local sub-contractor, Kosovo Agricultural Input Dealers Association (KODAA), to plant, maintain, harvest and compile information on the plot performance. These plots will be at four locations around Kosovo and each will be planted with five varieties to demonstrate both seed production techniques as well as a forage demonstration.

A purpose of this consultancy was to develop several protocol documents to aid KODAA in its task of developing the plots. The first document detailed the design of the plots including their establishment and monitoring. Another document was on the operation of two sets of field days, while a third was to clarify what and how plot data should be gathered and presented in the final report. The content and wording for an alfalfa seed production brochure was also written and it can be developed if the plots show seed production potential.

The plot design document was used in an informal training for KODAA so they would understand how they are to manage the plots. The consultant also worked with them doing on-farm selection of the plot locations as well as meeting the farmer cooperators and inspecting the machinery to be involved.

Since the production of one seed type cannot exist on its own in a country that has a seed industry infrastructure, it was also necessary to inform members of that industry about the alfalfa seed production program. It seemed necessary to attempt to raise the awareness of those industry members from both the private sector and from government on best practices involved in the seed industry. Seed certification, processing and seed quality were topics discussed with a number of private sector seed dealers. Discussion with Ministry of Agriculture, Forestry and Rural Development officials and technicians involved seed lists, certification, seed testing and service to the industry. A training session on the various aspects of the seed industry in the U.S. was presented to a group that included individuals from both the private and public sectors.

FIELD ACTIVITIES TO ACHIEVE PURPOSES

The primary activity associated with this consultancy was to assist in the development of seed production demonstration plots in several locations around the country. After a seed production plot protocol was developed we visited with KODAA management and staff to train them on the steps of the protocol. It was emphasized that there should be consistency among the four locations and that the plots would need periodic monitoring during the growing season. KODAA has experience in demonstration plot establishment, including alfalfa for forage purposes so they seemed very capable and qualified for the task.

It was KODAA's responsibility to select the farmer cooperators who will provide the land and assist in the plot plantings. On three separate days we traveled with the KODAA technician to Lipjan, Peja and Podujevo to look at the prospective locations and at each of the three locations we also met the farmer cooperator. The land for the plots was to be on flat, well-drained soil with good accessibility to the road for field day access. All the plot land for those three plots seemed appropriate to meet the criteria. The farmer cooperators also showed us the equipment they would be using and it was discussed how that would be set up. We did not have the opportunity to see the field at Gjakova because the farmer was involved with a family funeral. KCBS Extension Specialist Milazim Makolli will visit and inspect that field as well and will work with KODAA and the farmer on at least part of the plot during planting time.

We visited several governmental offices for discussions or to give information on the alfalfa seed program. On my first day in Kosovo we visited the Ministry of Agriculture, Forestry and Rural Development (MAFRD) to provide them information on our purpose in testing alfalfa seed production. In the same trip we visited the Seed Sector of MAFRD and discussed seed certification, the Recommended Seed list and talked about an upcoming training program.

We also visited the Agricultural Institute in Peja. There we talked with the Chief of Seed Sector, Bakir Kelmendi about seed testing, the seed list and varietal testing. In addition we had a tour of the facilities. I had the opportunity to work with several staff members as well in helping them to locate several seed related websites that should help them with some of their work.

We visited several companies and associations with seed production and seed sales. The Seed Growers Association in Gruri was very interested in our conversation about comparisons of the seed industry in Kosovo versus the U.S. They also have some concerns about getting quality parent seed, moving seed across borders and seed certification. They had some processing equipment that they wanted us to see but time and road conditions made that impossible.

Fitofarma Seed Company in Ferizaj was another visit where we had a discussion about alfalfa seed production. One of their employees had some alfalfa seed production experience from before the conflict and was able to offer a bit of insight into that. They are also interested in seed production as well, but are concerned about dodder problems. Dodder is a weed whose seed is about the same size as alfalfa seed and thus difficult to remove from seed lots. We talked about seed cleaning equipment and I diagramed how a velvet roll mill is used to remove dodder from alfalfa seed lots. On a later visit we stopped to see their retail facility and seed cleaning equipment.

Two other companies we visited were AgroUnion and Xina Seeds. Both have some involvement in seed production of wheat, and are interested in alfalfa seed production. Both have seed cleaners that are used mostly for wheat. We also visited AgroUnion's wholesale/retail store out-side of Pristina.

Semenarna Seeds is a Slovenian company with an office near Pristina. They produce alfalfa seed varieties through a breeding program in Slovenia, and are interested in alfalfa seed production in Kosovo. If alfalfa seed production appears to work here, they will most likely be a large player. Semenarna also has a modern lawn/garden retail store and warehouse just outside of Pristina.

AgroElita Seeds in Klina has recently privatized the former SOE seed processing facility there and is currently producing wheat and barley seed. They have a very large small grains processing and storage facility that is currently be utilized at a fraction of its capacity. The AgroElita facility also has a very nice alfalfa seed processing line that was donated by FAO in the year 2000 but it was hardly ever used. This line has all the necessary equipment to do an excellent job of alfalfa seed conditioning, and has ample capacity to clean all the alfalfa seed potentially grown here.

Additional visits where made to the Farmers Association in Gjakova and MAFRD to make presentations. Information on these presentations is covered in the Tasks section of this report.

TASK FINDINGS AND RECOMMENDATIONS

Task 1: Advise the local subcontractor on the establishment of four alfalfa seed production demonstration plots one hector in each in four locations with varying agro-climatic conditions.

Findings/Recommendations - A document with all the pertinent information on the establishment and monitoring of the alfalfa seed plots was written as described in the SOW deliverables. This document is found in Annex 1 of this report.

In a meeting with the KODAA subcontractor, the document was discussed and they were informed of the duties involved. Additionally we visited three of the four locations and looked at plot placement and the equipment to be used for planting and harvest.

Task 2: Document describing activities of the planting and monitoring Field day

Task 3: Document describing activities of the harvest Field day

Findings/Recommendations - A document to describe both of the tasks was developed as described in the SOW deliverables. This document is found in Annex 2 of this report.

KCBS Extension Specialist Milazim Makolli was briefed on the activities since he will have oversight over the Field Days.

Task 4: Document describing the repot of data from the plots

Findings/Recommendations - A document to describe the reporting activities involved in the data and information from the seed production plots was written as described in the SOW deliverables. This document is found in Annex 3 of this report.

KCBS Extension Specialist Milazim Makolli was briefed on the needs of the report, as he will be working with the subcontractor.

Task 5: Assist in the development of a brochure on alfalfa seed production and management.

Findings/Recommendations - A document was written with all the pertinent information to be included in a brochure as described in the SOW deliverables. KCBS Extension Specialist Milazim Makolli will add pictures and have the brochure printed after the plots are harvested. This document is found in Annex 4 of this report.

Task 6: Conduct one training seminar for seed multipliers.

Findings/Recommendations - One of the stated purposes of the alfalfa seed production plots was to see if the methods used in production would work here. Any training should use the best methods that were learned for the plots. Therefore any seed production training seminar should be held after the plots have been harvested in the fall and before the potential seed grower's plant next spring. It is recommended to present this seminar after that information has been collected.

In all the visits with seed companies, seed production was discussed, especially focused on the individual needs of each. In addition a presentation titled "What is Seed?" was given to the Dushraya Bec Farmers Association. This presentation helped the farmers understand the process that makes seed special and not just grain. Included in this presentation was some information that would help seed multipliers produce their crop. About 60 farmers were in attendance.

Task 7: Conduct a training session for seed multipliers, Agricultural Institute and Ministry of Agriculture staff on the US seed industry.

Findings and Recommendations - A seminar for 22 individuals from participating seed companies, MAFRD officials and Peja Agriculture Institute technicians and inspectors was held at MAFRD. The presentation covered variety development, variety testing, parent seed production, seed certification, seed testing, seed processing, seed regulatory control and intellectual property rights. The topics brought up many questions and comments. Almost universally, the seed company individuals present would prefer going more toward the US system, while the MAFRD officials discounted those methods and espoused the benefits of the current system in Kosovo. This Power Point presentation is found in Annex 5 of this report.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE ACTIVITY

Conclusion/Recommendation 1: Mini-laboratory for examination of seeds proposal from AgroElita Seeds, Klina.

AgroElita has requested €12,500 for a small laboratory for the testing of seeds for their company. In the proposal, there are listed eight points under the scope of the project, briefly they are:

1. Basic control of incoming raw seed.
2. Improvement of quality and decreased use of pesticides
3. Detection of suspect items from import
4. Control of imported inputs
5. Farmer training on Plant Protection
6. Prevention of importation of invalid pesticides
7. Maintenance of the ecosystem
8. Proper pesticide use

My view of the essence of points two through eight is that their purpose is more on the use, misuse and control of pesticides than on seed production. The list of requested equipment would seem to back this up.

The normal purpose of a laboratory within a seed company is quality control testing for germination, purity and moisture of the seed they purchase and sell. These laboratory tests are often for internal use and this is especially true in this part of the world where a seed company laboratory could not be accredited to perform an official test for labeling purposes. A basic seed analysis lab would probably perform moisture tests, quick germination and mechanical purity analysis. The equipment necessary for this operation would cost less than the amount requested and the manpower required would be possibly one individual with some seed analysis training, plus one technician with some on-the-job training.

AgroElita's request to do work involving pesticides would probably be more of a major endeavor than they anticipate. The monitoring and testing they are proposing requires a higher level of expertise and lab personnel with training most likely not available in Kosovo. There is also no indication that they would intend to perform any of this work for any other entity beyond themselves, so consequently there would be no outside income generated for this activity. Most of what they are proposing would have little effect on the final quality of their seed and there is no indication that this work would add value to the seed product they are selling. Additionally, the Agriculture Institute in Peja is less than an hour drive away and is most probably much better equipped to do the pesticide testing that they are proposing. The Agriculture Institute could very likely provide training for the lead lab technician.

AgroElita is just a fledgling seed company, and production of small grains seed is currently their only activity. It would seem very logical that at this point that they stick very closely to activities associated with their main purpose.

These comments should not be necessarily considered a recommendation to purchase the equipment for AgroElita, but rather as an alternative to their proposal. AgroElita would have to agree that they want to perform this activity and would support it by supplying the technicians, updating the facility and with their on-going monetary support.

Should support be forthcoming, the following is a list of equipment that would be necessary for an in-house quality control seed company seed lab. The information and prices are derived from Seedburo Equipment Company (www.seedburo.com) but similar equipment can be sourced through other suppliers:

- SSG/A...Tabletop Germinator,

c/w extra 54H/A heating element and 548T Thermometer	\$2,000
➤ SBM 91 Binocular Microscope	\$ 800
➤ MC150/C Magnified lamp w/2 extra bulbs	\$ 325
➤ 135/a Purity board w/2 extra bulbs	\$ 350
➤ #650 Vacuum pickup unit with #660 accessories	\$ 200
➤ WSB weed seed booklet	\$ 5
➤ #34 Boerner divider	\$1,400
➤ MGD Dickey-John Moisture tester	\$ 350
➤ #310 Balance scale	\$ 310
➤ Misc Lab supplies including germination blotters, forceps, and lenses & germination dishes, etc	\$1,000
Estimated total equipme	approximately \$6,800

Additionally, some equipment in the original estimate might still be necessary including the computer, lab furnishings for 2 lab personnel, and lab renovation.

Conclusion/Recommendation 2—Alfalfa seed processing equipment

Dodder seed can be a major contaminant in alfalfa seed. Many alfalfa seed cleaning lines utilize air-screen cleaners, length graders and a gravity table to remove impurities from the seed but these units will not do a good job in removing dodder from the seed mass. The only physical difference that can be used to separate dodder from alfalfa is based on the surface texture of the seed, and the common mill used here is a magnetic mill. The only seed line capable of alfalfa seed cleaning in Kosovo is at AgroElita which contains one of these magnetic mills.

The AgroElita alfalfa processing line appears to be almost new, but unused for 6-7 years. If it is workable, it should have ample capacity for all the alfalfa seed produced in Kosovo for a long time. It is not known if the equipment is operable at this point. AgroElita has no operator with any experience in alfalfa seed processing. If this facility is to be used for alfalfa seed processing, they would need some expertise in the equipment use, start-up, operation and seed processing.

Additionally, if Semenarna decides to produce alfalfa seed in Kosovo they indicated that they would do their own seed processing. The indication was that they have some equipment in Kosovo but no seed texture separation equipment needed for dodder removal. If they decide to progress with alfalfa seed processing they could consider using a velvet roll mill for dodder. This machine is the common machine for dodder in US alfalfa plants, and is less expensive and easier to operate.

Experience and some searching showed that there is only one company that makes a velvet roll mill, W.A. Rice Company of the U.S. Although there are a number of dealers who could supply new units to Kosovo for around \$20,000, one company, Commodity Traders International (www.commoditytraders.biz) would supply factory-reconditioned units for about half that price. Since these units are rather straightforward with not a lot of intricate moving parts, a factory-reconditioned model should be approximately equal to a new unit in life expectancy. It may be possible to find others who would sell reconditioned units as well.

It is not the recommendation here to purchase one of these units, but if Semenarna or some other company decides to install their own line this would be an alternative unit at a more reasonable cost. If possible it would be good to discourage any further seed processing.

capacity as long as the AgroElita facility has the capacity to clean all the seed produced, but they will need some specific expertise in getting their line operational.

Conclusion/Recommendation 3—Seed Processing Training

Seed equipment operation is an art. It is not as simple as to turn on the machines and run the seed until it is all through. Good seed processing contributes to the final quality of the seed lot and it takes a qualified operator to be able to set equipment to remove impurities without major product loss. Good seed equipment operator training will help those individuals who are involved to learn more about the process.

A processing training course should be presented to both the equipment operators and seed company managers. This training should be specifically for those people involved and not for general farmers or growers. Training could be held at the AgroElita plant and involve both classroom and hands-on sessions.

Conclusion/Recommendation 4—Continuing the Alfalfa Seed Plot work

The protocol and other work involved with these alfalfa seed plots should be followed up including:

- A review of the growing season and the activities & procedures that worked and of those that need improvement
- Informational meetings on seed plot results
- Training seminar for potential alfalfa seed growers

Conclusion/Recommendation 5—Seed Buyer Awareness

Seed buyers here seem to have little understanding of what to look for when buying seed for their own planting purposes. They don't seem to have much understanding of seed labels and the information on them. Although some crops are on the MAFRD variety list, the list provides little information on the variety itself and often contains obsolete varieties.

The PowerPoint training that was presented to the Dushrava Bec Farmers Association addressed this problem, but it could be expanded and presented to other farmer groups. This would help them to be better consumers and not just make a purchase based on the lowest price product.

Conclusion/Recommendation 6—Seed Certification Training

The training given to MAFRD and the Peja Agriculture Institute personnel revealed that they may not understand the specifics of seed certification techniques. Although seed certification in Kosovo and the U.S. has its differences, many of the specific hands-on techniques are identical. Since the trade of seed has become more universal, the need for identical quality control procedures is becoming more essential.

A training involving both classroom activities and in the field training could be given to those individuals who are involved in the process.

Conclusion/Recommendation 7—Easier Movement of Seed across Borders

Several times during this consultancy, comments were made about the difficulty of importing and exporting seed. Problems included loss of paperwork, long delays, need for retesting, and inconsistent procedures. This causes delays and costs seedsmen money.

It would be good to better understand the real problem and then assist local officials in understanding the problem and finding solutions that would be workable for all.

In the original discussions about this consultancy, a second trip near plot harvest time in August or September was discussed. If this was to happen, recommendations in points two through six above could be addressed.

ANNEXES

Annex I – Alfalfa Seed and Forage Plots

Annex II – Organizing and Conducting Alfalfa Seed Plot Field Days

Annex III – Interpreting and Reporting Field Plot Results

Annex IV – Alfalfa Seed Production Brochure

Annex V – “Seed Programs In the U.S.” PowerPoint presentation

ANNEX I: Alfalfa Seed and Forage Plots

Forage production in Kosovo is an important aspect of livestock production. The availability of reliable and high quality forages will have a positive effect on the livestock industry and the profitability of Kosovar livestock producers. The purpose of this activity is to explore the production economics and feasibility of alfalfa seed production in Kosovo. An additional purpose is to show the cultural practices, field performance and forage yield of those varieties being evaluated for their seed production abilities.

The objectives of this project include 1) to determine if the production of alfalfa for seed using best management practices can yield a significant amount of quality seed to make seed production economically feasible; 2) to compare several regionally available alfalfa seed varieties and observe any obvious differences in seed production ability; 3) to determine which regions of the country have an advantage in alfalfa seed production capacity; 4) to provide some forage yield information on the various varieties being tested; and 5) to use the plots to demonstrate to local farmers and prospective alfalfa seed producers the production potential of seed and forage of the various tested varieties.

The production of alfalfa for seed in Kosovo is a relatively new endeavor and therefore the specific technical expertise and experience of those individuals will be limited and it may be necessary to deal with a learning curve. Because of this factor and the several project objectives it will be less pertinent to report on a statistical basis. Therefore reporting will be on an observational basis only citing obvious differences.

Materials and Methods. Four 1ha. trials will be planted, in four separate parts of the country. The trials will be on uniform, well-drained soil suitable for alfalfa production. Sandy loam soils or other light soils are best for alfalfa seed production. Fields should not have grown alfalfa or clovers the previous 2-3 growing seasons with a rotation from wheat or barley being preferred. Avoid weedy sites, particularly if infested with troublesome broadleaf weeds such as dodder (*Cuscuta*), and clovers (*Trifolium* spp. or *Melilotus* spp.). The trials will be located on land that has proximity to roads with reasonably easy access for field day demonstrations.

The trial will include five plots, each approximately 200 m². Four of the plots will each be divided into two subplots with the forage study on the left subplot and the seed production on the right subplot. The seed production plots should be set up with a minimum of eight (8) rows of alfalfa so that the two outside rows won't be harvested and the row ends trimmed just before seed harvest to yield an 80m² test area.

The fifth plot will be entirely a seed production plot used just to perfect the seed planting and harvest techniques and consequently will be planted and harvested before the other four seed plots. This plot will be planted with Europa seed but it is not necessary to use Elite planting stock.

Land preparation will include a soil test for each of the four seed/forage production trials. P and K fertilizer will be applied as shown in Table A for each plot. Soil will be worked so it is fairly fine, free of large clods or residue, and firm. After planting the plots and subplots they must be well marked for easy identification and a detailed field map drawn with a copy submitted to KCBS.

Four seed varieties will be tested: Europa, a common local alfalfa used as a check; two adapted varieties supplied by Semenara Company from Slovenia; and two adapted varieties supplied by the Agricultural Institute in Nova Sod, Serbia. Seed will be tested for germination percentage and be inoculated with Rhizobia to insure proper nodulation.

Alfalfa is best planted in the early spring in late March or early April (same time as wheat or barley). If weeds are already present, they can be sprayed with non-selective herbicides before initial tillage. Seed will be planted in the forage plots at a rate of 30kg/ha, if seed germination is found to be lower, an increased rate may be necessary. The alfalfa must be sown shallow (less than 2 cm deep) in a firm seedbed. Seed production plots will be planted in rows with a distance between rows dictated by available equipment, but the row width will be the same for each of the four trials. Row width should also accommodate available cultivation equipment but a good rule would be 60 cm centers. Planting equipment for the seed plots will maintain the same seed rate settings as the forage plots but will block off or blind those seed tubes between the actual seed rows.

Plots will be flood irrigated as needed during the growing season. An established alfalfa seed crop will require greater than 120 cm of water (applied, precipitation and residual soil moisture) per year for optimum production. Pertinent information on irrigation should be recorded. Sprinkler irrigation will not be used. The goal is to put moisture into the soil rather than across the soil, at the proper time and in sufficient quantities. Do not allow the soil to become dry enough to stress the crop. Good soil moisture is needed until bloom, then irrigation levels and timing are gradually cut back to mid-bloom; this causes the alfalfa plant to have a more synchronous bloom at the expense of additional vegetative growth.

In the seed plots, after emergence, cultivation is used to control weeds. Weed control between the rows is accomplished using the tool bar and sweeps, which run just below the soil surface to cut weed roots. Sweeps come in numerous sizes, and can be adjusted for depth and angle. A new alfalfa stand should be cultivated two or more times up to the point when bloom and pollination occur. Cultivation can effectively control 80 percent of the weeds in the seed production field. For weeds in the crop row, a toolbar-mounted sprayer can be attached to the tractor or towed on a trailer behind the toolbar for spraying in the crop row. A post plant, pre-emergence application of Meteor and Prometrin, (4 liters Meteor+2kg Prometrin /ha) should be used for this purpose. As an alternative, this application can be applied in bands over the row by hand with a backpack sprayer. A general, broadcast spraying of the forage production plots with the same chemicals may also be necessary. Dodder patches (including the alfalfa and a perimeter of alfalfa) can be treated with non-selective herbicide that will kill the dodder as well as the host alfalfa or by burning with a torch.

Prior to bloom, monitor closely for insect pests. If these are building up prior to bloom, treat with an appropriate insecticide because during pollination treatment options are more limited. Plots should be walked periodically to assess weed, insect infestations and to monitor the crop condition. Small infestations of weeds can be pulled by hand. Any pulled dodder (*Cuscuta*) plants should also be removed from the field.

The forage production plots will be harvested at the late bud to early bloom stage. Hand harvest three random 1 m² areas in each subplot, weigh the samples and use appropriate methods to achieve a total dry matter yield. Seed plots are harvested when the majority of the seed horns are dry and the first ones are beginning to crack open. Harvest the practice seed production plot first, setting the harvest equipment so not to lose much good seed and operate with a low cylinder speed and at a low air setting. Maintain those settings for the seed production plot harvests. All seed in the harvest equipment should be cleaned out between plots. Harvested seed should be weighed and the resultant seed and data delivered to KCBS.

In subsequent years after the seedling year, the first cutting of forage on the seed production plots should be cut at late bud and removed from the plot. The second cutting will be used as the seed production crop.

After the final cutting, remove all the crop residue from the seed plots and take a soil sample from each of the production plots. The plots should then be fertilized back up to original plot fertility levels. If dodder was present in the previous year, a soil active herbicide should be used such as Prowl. It has excellent activity to control dodder in the spring, as well as to control most other germinating seeds.

Table A. Alfalfa Seed Field Fertilization Levels

Nutrient		0 ppm	3 ppm	8 ppm	12 ppm	16 ppm	
Phosphorus	<i>Soil Test Level</i>	0 ppm	3 ppm	8 ppm	12 ppm	16 ppm	
	<i>P205 Fertilizer Application kg/ha</i>	155	125	85	45	0	
Potassium	<i>Soil Test Level</i>	0 ppm	50 ppm	100 ppm	150 ppm	200 ppm	250 ppm
	<i>Fertilizer Application kg/ha</i>	265	230	190	155	105	35

ANNEX II: Organizing and Conducting Alfalfa Seed Plot Field Days

Field days are a good way to show participants how a crop will perform in the field. Participating farmers can see the condition of the crop and often pick out differences due to variety, fertilizer application, insect infestation, diseases or varying cultural practices. During field days it can be more difficult to keep participants' attention if the information presented is less pertinent to what is actually in the field, if the topic is too technical or if the talks about any one subject go on too long. This is because a farmer is in his natural element in the field and he sees a number of things happening out there and will tend to lose interest in one topic if another is available. This is combined with the fact that the participant is standing and walking and has the immediate ability to move on from one subject to another as soon as his interest lags.

Fields are a more difficult environment for those leading a field day discussion as well. Voices will not carry as well and if the speaker cannot be heard well the interest will lag. Winds and other weather conditions can make it more difficult to get words across to the ears of the listeners. Any props, easel pads, or brochures are subject to be wind-blown not only making the presentation more difficult but also distracting to the listener.

The presentation of training materials is usually better in a classroom setting where participants are seated and the main presentation activity is only at the front of the room. It is therefore important to think about what type of material is presented at a field day or should the material be presented later in a classroom type training session.

There is only so much that we can do to keep participants' interest, so field days should be set up as an educational opportunity for those who have shorter attention spans or who learn in other ways besides listening to a speaker. Put signs up with variety names and treatment information. Another sign with general treatment information (planting dates, fertilizer application, and pest control) might be appropriate as well. Make sure that the plots are easily distinguishable from each other and that tall grass and weeds around the plot are cut down. Make sure that any companies or institutions who have donated seed, other inputs or money for the establishment of the plot are both recognized and have an opportunity to display product or organizational information.

Field day presenters should be reminded to keep their talks appropriately brief, and to the point of what is actually visible in the field. During the talk they should refer to or point out what is in the field as it pertains to the point being made. Speakers should talk loud enough so that all participants can hear. It might be considered to distribute any handouts after the talks because if they are in the hands of the participant, they can be distracting or the participants might be reading in the brochure about topics other than what the leader is discussing.

Alfalfa Seed Multiplication Field Day

This field day will highlight the practices used in producing alfalfa seed and how that is different from forage production.

Choose a date where the plot will have the most to show. A good time would probably be just before the forage plots are to be cut the first time. A plot of growing alfalfa is much better than a bare, recently cut field. This will also give you 6-8 weeks before the second field day that will discuss harvest techniques.

Try to have 3-4 people giving presentations to the group. This will vary the tone of the day and will help to maintain interest. Using a USAID or KCBS official to give a welcome and

introduction might be ok, but it should be short because there will be little in a welcome speech that pertains to what is directly seen in the plots by the participants. Milazim might talk generally about the plots, the reason for the demonstration and the treatments. The sub-contractor who maintains the plots could talk on the specifics of planting and maintaining the plots as well and about any specific problems involved. It would be good to invite a representative of Semenarna to talk specifically on the alfalfa varieties that are in the plots and of any type of program or practical procedures they might have for a Kosovo farmer to produce seed for them.

Using a University professor to discuss a topic such as alfalfa soil fertility or alfalfa forage quality might be good, but it should be remembered that professors are used to giving technical lectures in a classroom of students. In a field day they should have a shorter and less technical presentation that refers to the plots at hand.

Since we are trying to demonstrate how farmers can produce their own alfalfa seed, try to have some of the equipment needed for establishment at the field days. A quick talk about using a grain drill for planting alfalfa, especially if the farmer has to understand how to block off or blind several drill spouts just to get the desired row width. A tractor with the correct tool bar actually cultivating a plot would hold interest as well demonstrate this unit as a weed control tool. An exhibit of a back pack sprayer and the containers from those pesticides actually needed for seed production would be better than just talking about them.

Although the purpose of this field day is for alfalfa seed production, there is also a forage plot for each variety. Therefore a larger group of farmers might be invited. This would give the opportunity to expose seed production to a larger group of farmers but would also expose the seed varieties of the donor seed companies to the general farmers. At the end of the field day, farmers who are interested in actually growing alfalfa for seed should be given the opportunity to sign up for the next more specific field day involving harvest techniques.

Alfalfa Seed Harvest Field Day

This field day is more specific to the actual production of alfalfa for seed and therefore should only include those farmers who want to learn more about what is needed to do that. Be more specific as to who is included but be sure to add any farmers or association members who may not have been at the first field day but would still seem to have some interest.

This field day should be held a short time before harvest so that participants can see what the plant and seedpods look like when they are close to being ripe. Be sure not to schedule the field days too close to harvest time, just so they won't cause a harvest delay that could mean seed pod shattering and yield loss. Additionally, since we are trying to get seed yield information, participants should be kept out of the seed plots during this field day. If they want to see the alfalfa plants/seed pods up close, this can be done in the 'practice' seed production plot.

After the opening pleasantries the plot sub-contractor might be asked to describe what has happened in the field since the previous field day. A representative of the Ag Ministry could discuss the requirements and procedures for producing seed under the seed certification program. It might be good to have a combine on hand to discuss clean-out of the machine and how to set it up for harvest of alfalfa seed.

The representative of Semenarna might want to discuss any contracts or other specifics involved in the production of seed for them.

There will have been enough time for one or maybe two harvests of the forage plot. Some distribution of comparative yield information might be handed out and discussed.

ANNEX III: Interpreting and Reporting Field Plot Results

The alfalfa seed plots are being put together as a demonstration to see if the methods that are being employed will work for field production and as a demonstration to seed growers on how we believe that the seed crop should be grown in the future. At this point it is just a demonstration to the seed growers of one system and not a comparison of several possibilities. Additionally, the individual seed & forage yield results should not be taken too seriously because this is merely a demonstration and not a statistically correct and replicated study. The plots are designed to show production practices but not to distinguish which of the five varieties is best used to grow seed in Kosovo.

It is most likely that an alfalfa seed supplier such as Semenarna would make the selection as to which of the varieties would be used to grow seed. The decision as to which variety to be used would be more based on their needs and how they believe the varieties would perform than their performance in these plots. So, any individual yield claims should be avoided or at least downplayed as statistically insignificant.

Since a purpose of the plots is also to see if there is an advantage of one region of Kosovo over another in alfalfa seed production, consideration should be given to individual events, *i.e.* moisture stress, pest infestation or field anomalies that would not be a real indicator of how seed production would work in a particular region.

So there are probably only two real questions we can answer with these alfalfa seed production plots. The first question is “Is it economically and practically feasible to produce alfalfa seed in Kosovo?” and secondly, “Will the cultural practices that we employed be those that the seed producer should use?” Any other like varietal or locational differences will most likely hold less meaning. So a report of the plot activity should focus on the methods used to grow the seed and illustrate if the potential yield is adequate to show a profit.

Alfalfa Seed Production Plot Report

Briefly describe the four plot locations, noting soil condition, drainage or any problems encountered in the locations.

Describe the cultural practices applied:

- Land preparation
- Seed rate
- Row width
- Soil fertility
- Weed problems & solutions
- Varieties planted including a brief variety description
- A description of the equipment used to plant, maintain and harvest the crop

Describe the growing season & harvest and any challenges that came up:

- Moisture stress including irrigation problems
- Insect, disease & weed infestations
- Cultivations
- Harvest date and practices
- Seed yield by variety and location
 - Say that any difference are probably not real and they should be not considered as very relevant
- General condition of the seed

- Seed size—as a comparison to seed of that variety planted
- Any general comments from the sub-contractor or the farmer/host

Forage Plots:

- Describe any differences from the seed plots
 - Seed rate
 - Row width
 - Others
- Harvest dates and stage of growth
- Harvest procedures
- Yield information

Costs (*this will become more appropriate to report over the entire life of the field*)

- If it is possible, calculate the costs involved and begin to get a picture of the cost and returns of alfalfa seed production
- Cost amortized over the life of the stand
 - Land preparation
 - Seed costs
- Yearly costs
 - Pest control
 - Harvest costs
 - Land rent

Conclusions

- Do the results indicate that alfalfa grown for seed is a viable crop?
- Are the practices used workable for alfalfa seed production in Kosovo?

Future

- Will the plots be maintained for the coming years?

ANNEX IV: Alfalfa Seed Production Brochure

Alfalfa is a major crop in Kosovo and it is adapted well for use here. It is used in animal pastures as well as for hay production. Until recently all the seed used to plant alfalfa fields has come from outside of the country. More recently test plots have shown that alfalfa seed production is a viable alternative for Kosovo.

Common seed can be grown by a farmer for local use, but if the variety is owned by a seed company, it will probably require a seed production contract with that company before production can occur. Check with local agronomists, alfalfa seed companies or KCBS if you consider growing alfalfa for seed.

Land selection

The best alfalfa is grown on uniform, well-drained soil. Sandy loam soils or other light soils are best for alfalfa seed. Fields intended for seed production should not have grown alfalfa, clovers or similar crops the previous 1-3 growing seasons; a rotation from wheat or barley being preferred. Avoid weedy sites, particularly if infested with troublesome broadleaf weeds such as dodder (*Cuscuta*), and clovers (*Trifolium* spp. or *Melilotus* spp.).

Land Preparation

Land preparation should start with a soil test. P and K fertilizer will be applied to each plot as listed in Table A. Soil should be worked so it is fairly fine, free of large clods or residue and firm.

Variety Selection

Seed for commercial production will most likely have to be contracted with an alfalfa seed company and their contract may stress variety, cultural practices and seed quality levels. Seed should have a current germination test and be inoculated with Rhizobia to insure proper nodulation.

Planting

Alfalfa is best planted in the early spring in late March or early April (same time as wheat or barley). If weeds are already present in the field, they can be sprayed with non-selective herbicides before initial tillage. Seed production plots will be planted in rows with a distance between those rows dictated by available equipment. Row width should also accommodate available cultivation equipment but a good rule would be rows on 60 cm. centers. If alfalfa is planted with a grain drill it will be necessary to block off or blind some seed tubes between the actual seed rows to establish the real row width. The alfalfa must be sown shallow (less than 2 cm deep) in a firm seedbed.

Planting rates should be set as low as the drill will allow. Lower plant numbers per hectare will actually produce the best seed yields with a goal of 25,000 plants per hectare being a good number; this translates to a seed rate of 0.5 to 1.0 kg of seed/hectare. If subsequent stands are well above the 25,000 plant rate thinning of the established field may be necessary.

Moisture Requirements

Plots will be irrigated as needed during the growing season. An established alfalfa seed crop will require greater than 120 cm of water (applied, precipitation and residual soil moisture) per year for optimum production. The goal is to put moisture into the soil rather than across the soil, at the proper time and in sufficient quantities. Do not allow the soil to become dry enough to stress the crop. Good soil moisture is needed until early bloom, then irrigation levels and timing are cut back through pollination; this causes the alfalfa plant to have a more synchronous bloom at the expense of additional vegetative growth. Adequate

moisture is required as the seed matures but irrigation should be stopped at the time the seeds have filled properly so that the plant can dry before harvest. If irrigation is available, another good wetting of the soil before the plants go into winter dormancy will help to maintain a stronger stand.

Weed Control

In the seed fields, after plant emergence, cultivation is used to control weeds. Weed control between the rows is accomplished using the tool bar and sweeps, which run just below the soil surface to cut weed roots. Sweeps come in numerous sizes, and can be adjusted for depth and angle. A new alfalfa stand should be cultivated two or more times up to the point when bloom and pollination occur. Cultivation can effectively control 80 percent of the weeds in the seed production field. For weeds in the crop row, a toolbar-mounted sprayer can be attached to the tractor or towed on a trailer behind the toolbar for spraying in the crop row. A post plant, pre-emergence application of Meteor and Prometrin, (4 liters Meteor+2kg Prometrin /ha) can be used for this purpose. As an alternative, this application can be applied in bands over the row by hand with a backpack sprayer. Dodder patches (including the alfalfa and a perimeter of alfalfa) can be treated with non-selective herbicide that will kill the dodder as well as the host alfalfa or by burning with a torch.

Pest Control During the Growing Season

Prior to bloom, monitor closely for insect pests. If these are building up prior to bloom, treat with an appropriate insecticide because during pollination treatment options are more limited. Plots should be walked periodically to assess weed, insect infestations and to monitor the crop condition. Small infestations of weeds can be pulled by hand. Any pulled dodder (*Cuscuta*) plants should also be removed from the field and destroyed.

Pollination

Alfalfa seed yields can be significantly affected by introducing bees as pollinators. Adequate numbers of bees near the seed field increase the seed set and therefore the amount of seed produced. In major alfalfa seed production areas, the leaf cutter bee is used because honey bees are less efficient at this type of pollination, but honey bees can offer some pollination advantages as well.

Seed Certification

Having the seed certified will probably be a requirement of any seed production contract. Seed certification may require a specific field history, removal of weeds and other unwanted plants from the field, and one or more field inspections during the growing season. It will be the responsibility of the seed grower to arrange for the seed certification process with the Ministry of Agriculture, Seed Section. Depending on your seed contract, it may also be the seed grower's responsibility to complete the certification process by having the seed cleaned and tagged.

Seed Harvest

Alfalfa seed production in many parts of the world uses a desiccant before harvest to dry the plant down and facilitate a clean harvest. If no desiccant is used there is a danger of seed drop before the plants are dried and the harvest can commence. Seed plots are harvested when the majority of the seed horns are dry and the first ones are beginning to crack open. Set the harvest equipment so not to lose much good seed and operate with a low cylinder speed and at a low air setting.

After the final cutting, remove the entire crop residue from the seed field. Fertilize back up to original plot fertility levels. If dodder (*Cuscuta*) was present in the previous year, a soil active herbicide such as Prowl should be used. It has excellent activity to control dodder in the spring, as well as to control most other germinating seeds.

In subsequent years after the seedling year, the first cutting of forage on the seed production plots should be cut at late bud and removed from the plot. The second cutting will be used as the seed production crop.

Post Harvest Seed Handling

Harvested seed should be reasonably free of plant parts and trash. Any alfalfa seed lots containing excess plant parts may have to be cleaned so that the moisture in those plant parts will not be allowed to heat and damage the seed. A simple screen cleaner should be able to remove most of those impurities. Harvested seed should be stored in bags in a cool, dry environment. If there is any indication that the seed mass is heating, it can be dumped from the bags onto a clean, flat surface and allowed to air-dry. This practice may require the seed to be raked or turned to allow all the seed to be exposed to the air.

The seed will have to go through a cleaning process before it is ready to be bagged and planted. Your seed contract may specify if this is the responsibility of the seed grower. If seed is to be cleaned, it will take special equipment designed for alfalfa seed to do the job correctly, and avoid loss and contamination. The current options for complete alfalfa processing in Kosovo are limited.

Table A. Alfalfa Seed Field Fertilization Levels

Nutrient		0 ppm	3 ppm	8 ppm	12 ppm	16 ppm	
Phosphorus	<i>Soil Test Level</i>	0 ppm	3 ppm	8 ppm	12 ppm	16 ppm	
	<i>P205 Fertilizer Application kg/ha</i>	155	125	85	45	0	
Potassium	<i>Soil Test Level</i>	0 ppm	50 ppm	100 ppm	150 ppm	200 ppm	250 ppm
	<i>Fertilizer Application kg/ha</i>	265	230	190	155	105	35

ANNEX V: "Seed Programs in the U.S."

PowerPoint presentation

SEED PROGRAMS IN THE UNITED STATES

Jim Stanelle
Seed Consultant to KCBS

THE SEED INDUSTRY IS BUILT ON TRUST

The industry has developed with a set of checks and balances to monitor all activities, but also with a belief by all the participants that the production and sale of quality seed will benefit the entire industry.

Variety Development Programs

- ☐ Public Programs
 - Agricultural Universities
 - Basic Research—germplasm
 - Specific trait development
 - Developed genetics available to Public and Private seed companies
 - Applied—Variety Development
 - New varieties made available
 - University variety development is decreasing
- ☐ Private Seed Company
 - Both basic and variety development
 - May use university developed germplasm
 - Some companies only develop parent stock for others
 - Based on the ability to maintain control of the variety and to make money from its sale

Variety Testing Programs

- ☐ Public Crops Testing through University Extension
 - Test both public and private varieties
 - Charge private companies for testing
 - Release results as test summaries/Field days
- ☐ Private Seed Companies
 - Test their own varieties against popular varieties
 - Publish brochures/Field days
- ☐ The US has no Seed Lists
 - Information is supplied to seed buyers and they are allowed to make planting decisions based on their needs

Parent Seed Production

- ☐ Public—Foundation Seed Organizations
 - Associated with Universities
 - Maintain the variety over its life
 - Work with breeders to maintain purity
 - Utilize seed certification standards
 - Sell seed to Seed Growers
 - Usually self-supporting from sale of seed
- ☐ Private Seed Companies
 - Maintain their own foundation seed
 - Use seed certification or develop their own standards

Seed Certification (1)

- ☐ Seed certification is voluntary
 - Only has control over seed in its program
- ☐ Independent Third Party controls
- ☐ Federal and State Seed laws provide for certification
- ☐ Each state provides for its own certification
- ☐ Often affiliated with Ag. University
- ☐ Seed grower associations often control certification
- ☐ National certification association standardizes basic standards—AOSCA
- ☐ State agencies are free to change standards as long as they are above the minimum

Seed Certification (2)

- Standards , Monitoring & Services
 - Field History
 - Parent Seed Source
 - Field Inspections
 - Seed Processing
 - Seed Testing
 - Seed Labeling
 - Seed Sales
 - Marketing Assistance
 - Seed Production Training

Seed Certification (3)

- Limited Generation System
 - Foundation seed
 - Produced from breeder seed
 - Labeled with a White tag
 - Registered seed
 - Produced from Foundation seed
 - Labeled with a Purple tag
 - Certified seed
 - Produced from Foundation or Registered seed
 - Labeled with a Blue tag
 - This is the last generation that can produce seed
- Assures that seed is no more than three generations from breeder seed



Quality Control Systems Used by Certification Agencies

- Seed Certification
 - Assures Seed Variety and Quality factors
- Quality Assurance Programs
 - Monitors seed production steps
 - Does not necessarily assure variety purity
 - For varieties not suitable for certification
- Identity Preserved
 - Maintains the identity of the seed product
 - Often from field to manufacturing to final product
 - Program designed for individual customers
- Organic Certification
- Monitoring and Collection of Royalty Fees
- Any other program where third party monitoring enhances product value or consumer confidence



Seed Testing in the USA

- Standardized testing
 - ISTA, AOSA, or SCST oversight
- Laboratory Types
 - Governmental & Regulatory
 - Test only for seed control or research
 - Public
 - Usually agricultural university related
 - For regulatory, public samples, certification, research and education
 - Seed Company
 - Tests seed produced by the seed company
 - Commercial
 - Seed testing is their only business
 - Larger array of services
 - In business to make a profit
 - Test for many seed companies
 - Certification testing

Regulatory Seed Control

- Governmental Department of Agriculture
- Administer state and federal seed laws
- Independent of seed certification
- Routinely sample seed lots at retailer locations
- Seed is tested for compliance to laws
- Out of compliance seed is removed from sale
- Enforcement of Plant Variety Protection Laws
- Development of new seed laws in conjunction with the seed industry

Intellectual Property Rights

- Variety development is expensive and developers must get paid for the use of their varieties
- Many varieties are now subject to royalty payments
- Allowed seed companies to develop new genetic traits
- Plant Variety Protection
 - Allows the developer to maintain control of the use of the variety for seed production purposes after release
 - Farmers may save seed for their own use
 - Enforced through seed certification or by civil law
- Plant Patents
 - Allow for control of all seed and all resulting products
 - Farmers may not save seed
- Contractual Arrangements
 - Allow variety owners to prevent distribution of seed or products through contractual agreements

■■■■

IN THE USA THE SEED SYSTEM IS MADE UP OF A GROUP ENTITIES. EACH IS INDEPENDENT AND HAS ITS OWN ROLE AND THEY ALL WORK TOGETHER.

**The result is a
seed system
based on Trust**