

# From *Sarcopoterium* Thicket to High Quality Pasture in Two Seasons

United States Department of Agriculture – Forestry Service

Grant No. 04-DG-11132463-019

Demonstration Project

Final Report

submitted by

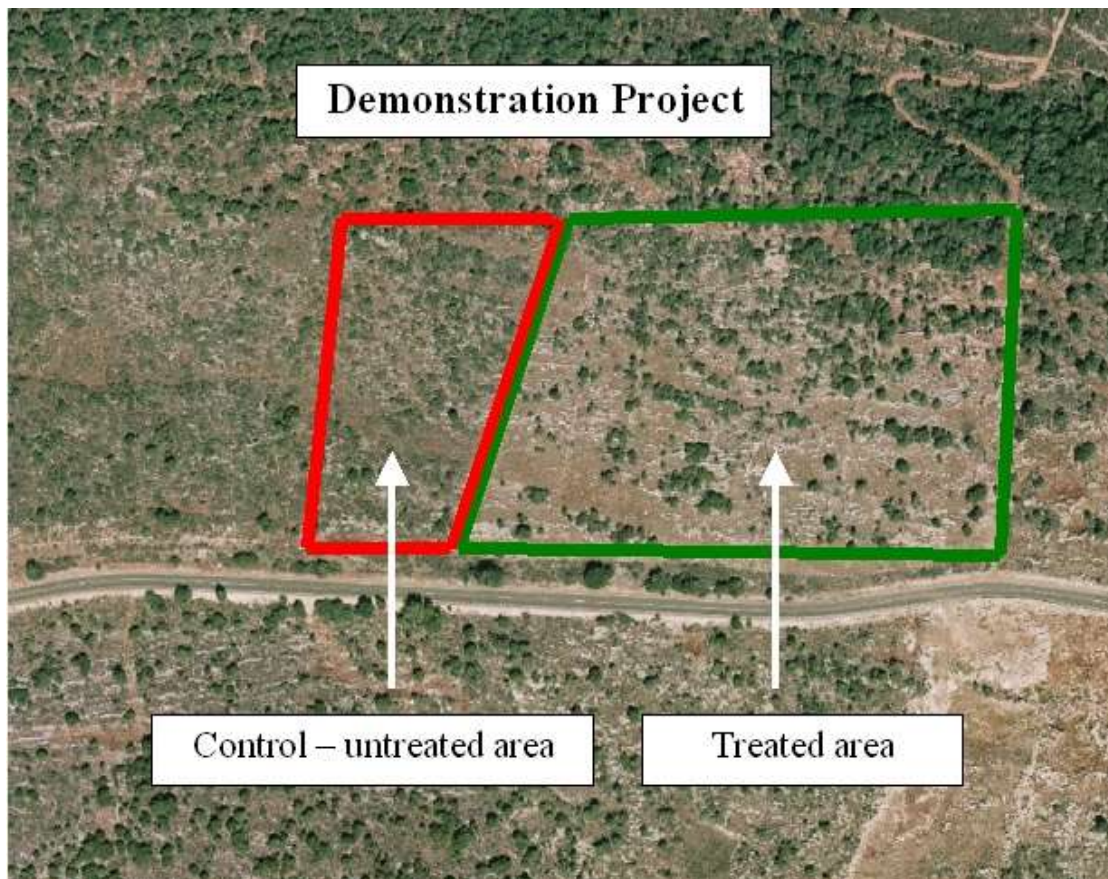
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## SUMMARY OF ACTIVITIES

This project aims to demonstrate that dense thickets of the dwarf-shrub *Sarcopoterium spinosum* (Ssp) can be profitably and rapidly converted to herbaceous pasture. Five-hectares of open shrubland heavily infested with Ssp thickets were selected near the En Yaaqov village in the western Galilee, Israel. The Ssp was sprayed with herbicide in the spring of 2003 and the shrubs were burned in late autumn. Phosphorus fertilizer was applied at the beginning of the 2003/04 growing season of the herbaceous vegetation. The demonstration area as well as a one hectare control plot was fenced in April and the woody vegetation was surveyed to establish a quantitative estimate of the initial state of the vegetation. The area was not grazed during the growing season but cattle were introduced to the area in summer.

The area was again closed to grazing at the beginning of the 2004/05 and 2005/06 growing seasons. The vegetation was surveyed at the peak of the growing seasons in April 2005 and 2006 and cattle were again introduced to the area in June.

At each stage of the project all activities were recorded and photographed both with still camera and video by a professional photographer. Some of the material that has been accumulated has been incorporated into the internet site that has been planned for the project.

An economic analysis of the project indicated that the benefits can cover the costs only after a period of at least 10 years (unless advantage is taken to treat areas cleared by unplanned wild-fire). The details of the analysis are presented in the present report and on the web-site of the project.

During the past half year, an internet site has been completed. Its address is [www.sarco.org.il](http://www.sarco.org.il). It includes an opening page that provides access to rest of the site that includes detailed sections on the background of the project and its initial stages (see appendix). An economic evaluation of the project was conducted and included in the site. Some of the sections of the site still have to be completed including a video clip of the main activities that are needed to achieve the goals of the project. This clip will be edited from the material that has accumulated and incorporated in the site.

## IMPLEMENTATION OF THE WORK PLAN

2003 April	Pre-treatment: application of herbicide (2,4-D). Four hectares at En Yaaqov, five hectares at Tsuriel
2003 November 18	Authorization of project
2003 December 1-5	Preparation for controlled burn (fire lanes around trees and border of the demonstration area with 'Bobcat' leveller.
2003 December 10-15	Controlled burn (Photo 4) on days suitable for burning (light westerly wind and low humidity)
2003 December 20-22	Application of fertilizer - 400 kg superphosphate ha <sup>-1</sup> , 25% P <sub>2</sub> O <sub>5</sub>
2004 April 15-30	Fencing of the demonstration area at En Yaaqov + 1 ha of untreated area for comparison at a later stage
2004 June 15-20	Measurement of shrub cover in demonstration area and in control plot.
2004 July - September	Cattle grazing introduced to the area
2004 November	Area closed to grazing throughout the growing season.
2005 January - May	Periodic visits to inspect fences and to monitor the progress of the vegetation cover.
2005 May 15-30	Survey of shrub cover and herbaceous vegetation development in the demonstration area and in control plot.
2005 June	Planning of internet site and editing of material to be included in the site.
2005 May - November	Grazing of the site by beef cattle
2005 August - December	Development of the internet site
2006 January - April	Maintenance and estimate of herbage biomass and composition
2006 April - August	Grazing by local beef herd
2006 August	Preparation of final report and completion of website and the movie (DVD).

## Was it worth it?

An economic analysis of the costs and benefits of the project

### Approach.

The costs of the project are front-ended, i.e. they are mostly invested at the beginning of the project before any benefits are realized. The economic analysis therefore has to be long term in order to allow enough time for the benefits to accumulate until they cover and exceed the costs. A suitable methodology for this situation is to calculate the net present value (NPV) of the flow of costs and benefits over an appropriate length of time. The criteria for judging the potential economic performance of the project are then the number of years until break-even is attained and the NPV over different time periods.

The data for quantifying the necessary parameters are the following:

Profit per cow		PPC	Data	100	\$/cow
Stocking rate	Treated	SR-T	Data	1.5	ha/cow
Stocking rate	Control	SR-0	Data	10.5	ha/cow
Profit per ha	Treated	PR-T	PPC/SR-T	66.7	\$/ha
Profit per ha	Control	PR-0	PPC/SR-0	9.5	\$/ha
Fixed costs	Treated	FC-T	Data	10.0	\$/ha
Fixed costs	Control	FC-0	Data	3.0	\$/ha
<b>Conservation costs</b>		<b>CC</b>	<b>fc+tb+ab</b>	<b>248.9</b>	<b>\$/ha</b>
Controlled area burn		fc	Data - actual cost per hectare	53.3	\$/ha
Tree fire breaks		tb	Data - actual cost per hectare	136.9	
Area fire breaks		ab	Data - actual cost per hectare	58.7	\$/ha
<b>Fertilizer cost</b>		<b>FC</b>	<b>pc+lfc</b>	<b>133.3</b>	<b>\$/ha</b>
Fertilizer cost		pc	Data - actual cost per hectare	88.9	\$/ha
Labor		lfc	Data - actual cost per hectare	44.4	\$/ha
<b>Herbicide cost</b>		<b>HC</b>	<b>hc+lhc</b>	<b>68.9</b>	<b>\$/ha</b>
Herbicide		hc	Data - actual cost per hectare	35.6	\$/ha
Labor		lhc	Data - actual cost per hectare	33.3	\$/ha
Interest rate			Average accounting interest rate	0.05	

The income from grazing the pasture was based on the net profit calculated by the local extension service for an average beef herd in the region and expressed here as annual net profit per cow.

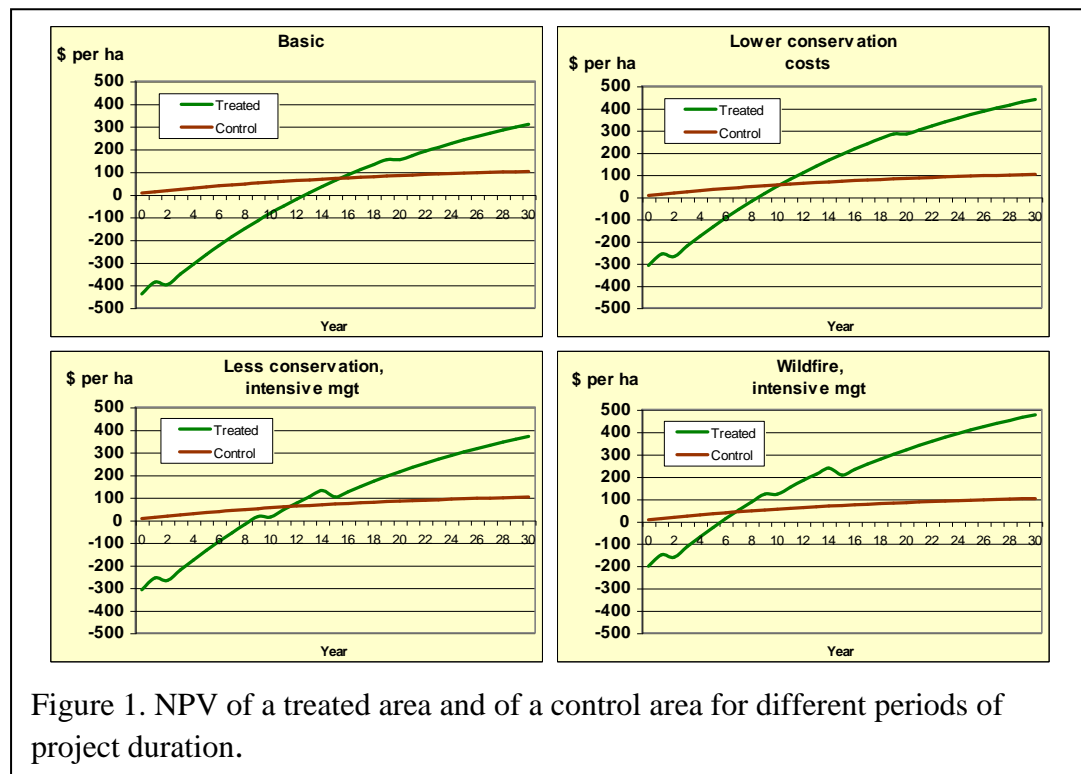
The cash flow for each year was calculated as the annual fixed costs plus the costs of treatment in the years that they were implemented.

Four scenarios were tested:

1. The basic scenario. Here all costs were imposed on the grower and follow-up control of re-encroachment of the *Sarcopoterium* shrubs was implemented only in the 20<sup>th</sup> year after the initiation of the project.

2. Shared conservation costs. As the expense of protecting the trees in the area from the controlled burn is one of the central interests of the forestry authorities, in this scenario the cost of tree protection is borne by them.
3. Shared conservation costs plus intensive management. With lower tree protection costs, this scenario assumes that control of re-encroaching shrubs and topping up fertilizer application can be implemented earlier.
4. Wildfire. Wild fires are common in the region and provide an opportunity to implement the treatment at substantially lower costs.

The NPV in each year of the treated vs. the control areas over a 30 year period are plotted in Figure 1.



The break-even year for each of the scenarios is given in table 1. The break-even year in this table is the year in which the NPV of the treated area is equal to that of the control.

Table 1. Break even year for the scenarios that were analyzed.

Scenario	Break-even year
Basic	16
Lower cons costs	10
Intensive mgt	12
Wildfire	7

A project of this nature is clearly a long-term project with a relatively extended period until the benefits exceed the costs. The initial costs of maintaining a safe controlled burn of the standing shrub vegetation is a major factor in extending the period until the break-even year. Consequently, the treatment is most rewarding if advantage is taken of wild-fires and the burnt area used for pasture improvement. In such cases, the break-even year is only 7 years after treatment.

Assuming that the results of the En Yaaqov experiment are repeated in the present project, the expected NPV's after 20 and 30 years are considerably higher than in the control area (Figure 2). In addition, there are about 7 times more beef cattle on the treated area than on the controls, so bringing added benefits to the farmers in the region.

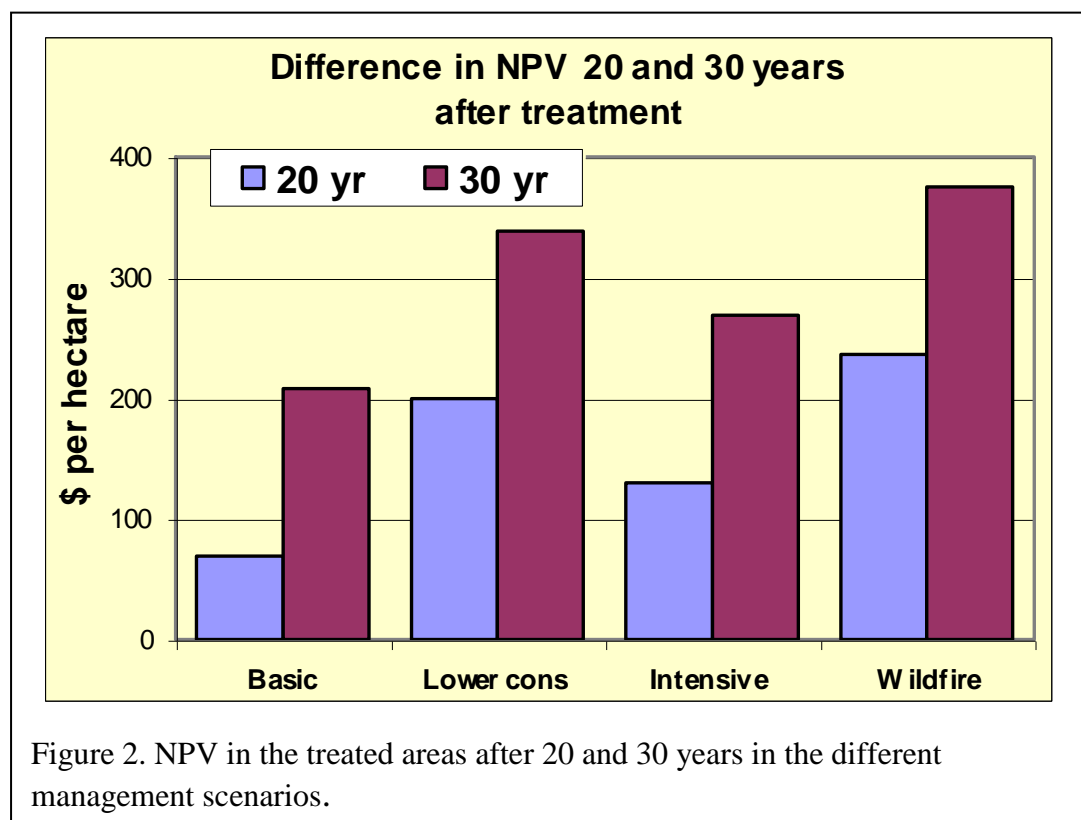


Figure 2. NPV in the treated areas after 20 and 30 years in the different management scenarios.

**Conclusion.**

The treatment demonstrated in the project has potential long-term benefits for animal production in the region. However, the period required to cover the initial costs of treatment is long for farmers in the region who may well have difficulties financing such a project. We therefore conclude that initial treatment will require some financial or logistic support from public authorities concerned with the development of the region. Subsequent maintenance should then be the responsibility of the farmers.

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Appendix: Elements of the opening screen of the internet site of the project

[www.sarco.org.il](http://www.sarco.org.il)

