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MAQUIS FOR BIOMASS IN GREECE

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Summary

In the Mediterranean basin about 200,000 hectares are burned every year, what means a tremendous loss of both energy and organics. Greece has to confront many oppresive problems such as fuel, wood, paper and animal food deficiency and at the same time has great expenditures on fire fighting. If the above problems are studied all together it is quite probable that the one will offer the solution to the other. That is, if we harvest mediterranean-type ecosystems every ten years we will profit energy otherwise lost while at the same time we will seriously reduce the possibilities of a catastrophic fire attack. Our first data with harvesting are quite promising since the system recovers very well and species diversity indexes are higher than in the unharvested one.

1. INTRODUCTION

In the region of the Mediterranean basin approximately 200,000 ha are burned annualy and by moderate estimation the aboveground biomass lost is of the order of magnitude of $1.2X10^7$ tons (1). On the other side great amounts of money are spent for "fire protection policies". In Greece more than 30 million dollars are spent for this reason every year. At the same time Greece is importing 90% of oil, 90% of paper and 75% of wood needs. Greek economy in 1982 faces a major deficit problem of 2.5 billion dollars in its payments balance, therefore the above cited imports are strongly contributing in that general economic instability, since increase in prices is reality.

Plants dominating mediterranean-type ecosystems (MTE) have evolved adaptations which permit them to recover after fire. Having in mind that from the 13 million ha of Greece 40% are covered by these MTE it is probable that by harvesting plants before a fire attack and with parallel proper use of their biomass a combined solution of all these problems could be an output.

2. MAQUIS AND FIRES

At the wet end of the precipitation gradient of the mediterranean-type climate a dense shrubland, dominated by evergreen sclerophylls, usually more than two meters high, like olive tree, kermes oak, carob tree, myrtle, lentisc etc is found. Around the mediterranean basin this ecosystem type is known with the term maquis while in California chaparral is the synonym.

The combination of high temperature and water deficiency during each summer causes a quick dehydration of shrubby and herbaceous components of MTE and leads to a high frequency of recurring fires (2,3). The subjection of this climatic type to fires has been known for many years and Shantz (2) in his review on the MTE of California refers to them as "fire-type" and states further: "... that this type was ever free from fires seems unlikely".

In general we can characterize MTE as "fire-induced" or "fire-adapted". Plants dominating in them have developed adaptations which not only help them to survive after a fire attack but periodic fires every 15 years or so appear necessary to maintain their viability (4). Shrubs dominating in maquis usually recover by resprouting and Naveh (5) refers to them as obligatory resprouters. After a fire attack recovery of plants is very quick and 5-10 years later the burned area cannot be distinguished from the unburned one.

The way with which the Greek State confront fires is excellently described by Bisvell (4) although he is occupied with the situation in California. Of course, the available material and the experience of the Greek firemen are still far back.

"In spite of man's capability to fight wildfires with the most modern aerial and ground equipment and the best trained firemen in the world, it seems certain that wildfires in chaparral cannot be completely prevented. Good intentions and large and expensive efforts in fire control do result in fires at less frequent intervals. But with longer time between fires, the fuels continue to build up and become more widespread, and when fires do get out of control, the toll in human life, natural resources, and cost is enormous".

Same author proposes prescribed burning every 15-20 years as a solution to these problems something which is a common practive in California and Australia today.

Using above data, we consider feasible to develop a system in which, not only a protection of maquis would be the output but a great gain in energy and organics, too. In Figure 1 our suggestion is presented in a simplified way. It seems that an ecosystem aged 20-30 years is mature to be burned (4,6). However, the net productivity, especially as the ecosystem approaches the climax state, is always declining. Therefore, 10 years after fire the aboveground biomass is only slightly increasing. If, instead of waiting a fire outburst, we harvest the ecosystem every 10 years the probabilities of a catastrophic fire are reduced and in parallel to that the net productivity is maintained at a high level. Estimation of a prefeasibility analysis published in a previous work (7) has shown that the harvesting cost of a 23,000 ha unit, harvested by 1/10 every year will be about 3 US $ per ton dry matter.

About 10% of Greece is covered by maquis ecosystems with an amount of dry biomass of about 5 $kg.m^{-2}$. Harvesting 2% of the area each year (that is 10% of the maquis coverage) may provide an equivalent of more than 60% of our oil imports. Undoubtedly, the mountainous relief of the terrain renders difficult the realization of this project -but it does not exclude it. There are many areas able to be harvested rather easily as the evidence of their transformation into crop fields suggests. It is estimated that at least 1,000,000 ha (about 8% of Greece) can be used for harvesting today, without major problems. If ten year-rotating-harvesting is followed -research suggesting that 8 years only may be sufficient for maquis recovery - with 100,000 ha harvested every year, the yield will be of the order of magnitude of 5×10^6 tons of dry biomass, what corresponds to an equivalent of more than 25% of our oil imports.

3. CAN HARVESTING SUBSTITUTE FIRE?

One of the first remarks when harvesting is suggested as a solution is whether the harvested system recovers in the same way as the burned system.

Trying to give a first answer to this question we started making observations in regions cleared in the past by the National Electric Corporation, in order to install high voltage lines safely. Figure 2 presents such a region cleared before 7 and 17 years. It seems that the system regenerates quite normally.

On the other hand, harvestings made by our team, proved that a rapid recovery is achieved even on the first post-harvesting year (Figure 3).

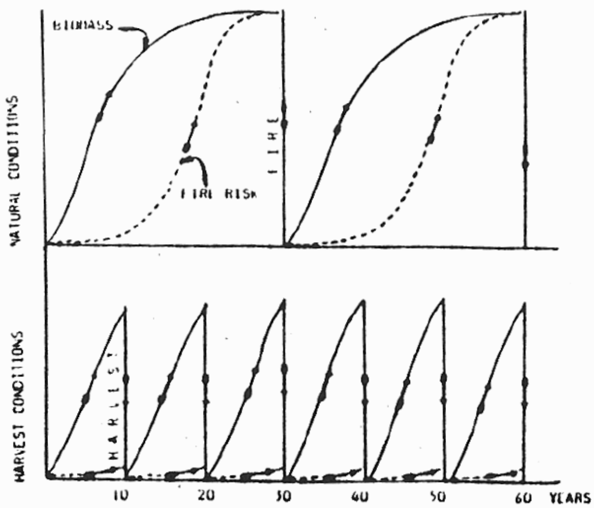

Figure 1. Biomass and fire risk in maquis under natural and harvest conditions.

Figure 2. An area harvested before 7 and 17 years. It seems that the harvested system recovers quite well.

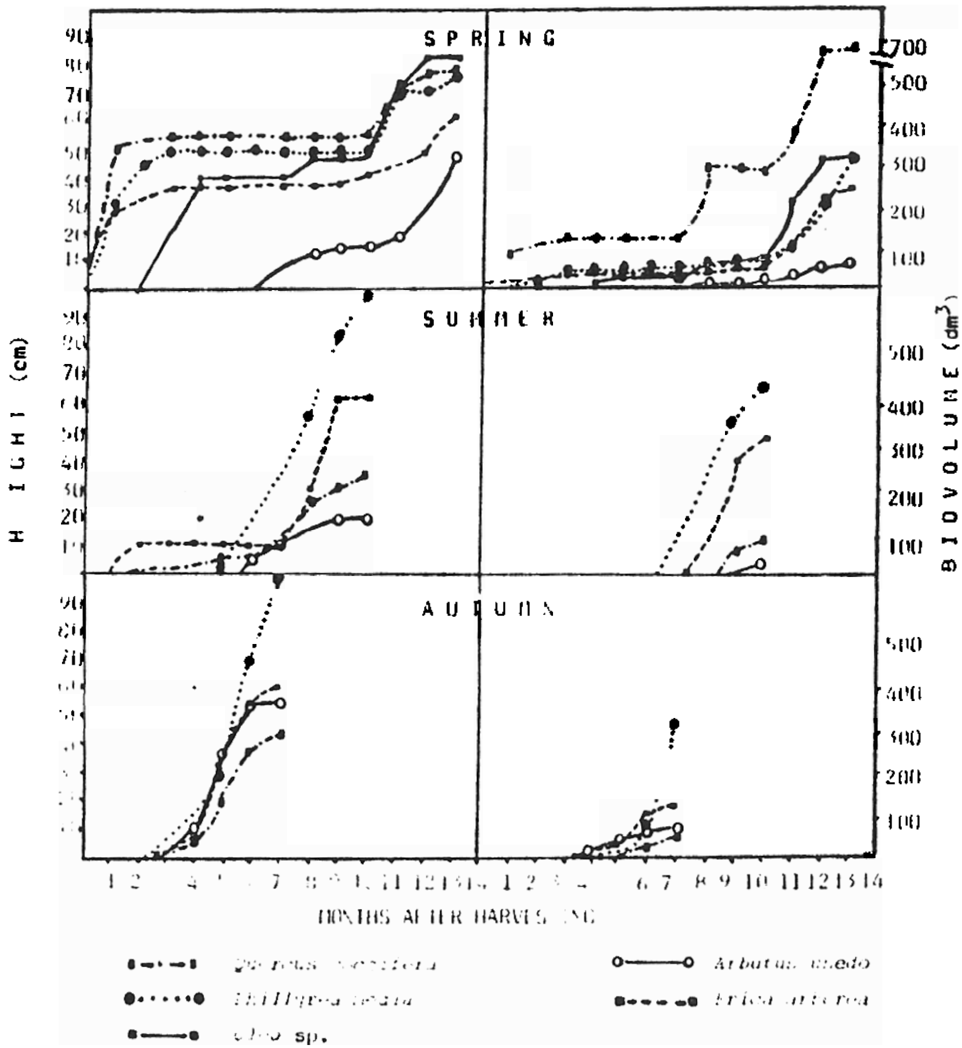

Figure 3. Recovery of dominant maquis shrubs after harvesting in different seasons is very quick.

Observations made during the spring of 1982 revealed a prelude of both woody and herbaceous plants. This tremendous offspring of plants blossomed coincides with significance increase in insects populations, since many of those plants are insect pollinated. This fact means that a complex system is developing, offering thus many and various niches and opportunities to diverse organisms.

In general we must state that with this type of management we are going to have not only economical benefits but also ecological acceptable solutions which already have been discussed in previous publications (8,9).

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