

## Potential use of the Eurasian jay (*Garrulus glandarius*) sawing for producing a succesful oak rejuvenation, an experiment in Portugal

### 1. The Eurasian jay (*Garrulus glandarius*)

The Eurasian jay (*Garrulus glandarius*) is a songbird from the family of ravens. The bird has a body length of 32 – 35 cm and a wingspan of around 53 cm. The jay is found in Asia, North Africa and almost all over Europe. In Portugal, it is only missing in the south in parts of the Algarve. The food spectrum of the Jay is very broad. From spring to autumn the animal portion of the food predominates, in the autumn and winter the vegetable portion. Interesting for us is its behavior of stockpiling. Over the whole year, the jay lays and hides supplies of surplus food. When distributing acorns and other nut fruits, however, he strictly adheres to the season from September to early January. When hiding the acorns, the jays cover considerable distances. Depending on the source a maximum of 4 - 10 km. The further away you are from the location, the lower the density of the hidden acorns. A single bird can hide as many as 3000 - 5000 acorns within a winter.

There are different opinions on why the jay hides the acorns. Some scientists believe that the usage is largely limited to using the buried acorns as winter food. Later germinating acorns were forgotten in the ground.

Contrary to that, the scientist Bossema has come 1979 to the conclusion, which later other scientists supported, that the jay mainly buries the acorns as a kind of "vegetable patch" for its offspring.

That means, that the jays bury the acorns with the goal to later take the cotyledons from the germinated seeds ( in a stage which the young oaks take no significant damage anymore) and feed them to their offspring. This would explain why acorns are often buried at sites that are particularly well suited for germination.

This behavior creates a remarkable symbiosis between oaks and jays. For example, this symbiosis is accorded great significance for the post-glacial return of the oak to the north from its southern European retreat areas.

### 2. The supported jay seed with the jay table, reasons for use and how to construct

The main idea of the jay table is, to animate the Jay to seed more acorns in a certain area by offering him acorns. The advantage of this method is that no acorn-carrying oaks must be present in the vicinity. It can therefore also be used if there are no oaks nearby. One condition for the method to work is that the composition of the ground vegetation and litter more or less corresponds to the preferences of jay. Thus, this process is particularly successful under pine trees, as one often finds a suitable ground vegetation here. Within the studies I read, the scottish pine (*Pinus sylvestris*) is mainly adressed, but I suspect, because of my observations while looking at pine forests near

Vouzela similar relations can be found with *Pinus pinaster*. Also under eucalyptus trees (*Eucalyptus globulus*) I could find a lot of young oaks, which probably grew from a jay seed.

A research on a former military training ground in Germany showed that jays consider a seed on vegetationless area to be unsuitable. Unfortunately, this could mean that jay seed is an improper means of acorn seed on blighted areas created by fires.

Joachim-Hans Bergmann, a former forestry professor from Germany, who was involved a lot with research about oaks, recommends a density of jay tables of about 4-6 tables per hectare and a seeding area size of 1 – 5 hectares. A reason for this size is not mentioned.

The racks of the tables are made of wooden boxes with a base of about 50 (40) x 50 (40) cm (different sizes are called), have a 10 cm high edge, so that the acorns do not fall out and stand on a 1 - 1, 50 m high stake so that other animals do not reach the acorns. It is important that any rainwater can flow out of the racks. For this, some holes can be drilled in the bottom of the boxes.

When setting up our own first two tables, we found that, apart from the previous construction of the parts, depending on the nature of the floor, the construction took about 15 – 30 minutes to complete. If some tables are used by jays, but others that are nearby are not accepted, it is advisable to rearrange these unused jay tables.

If a successful use of the jay tables can be determined, the remaining acorns should be removed about every 3 - 5 days. Since these are usually either hollow or rotten they will not be used by the jays. The jay table is then to be refilled with fresh acorns.

### 3. Experiment in Portugal, structure and results

So far, we placed two jay tables. The first in Montis' property in Carvalhal de Vermilhas and the second in Carvalhais, a communal property managed by Montis.

First to the jay table in Carvalhal de Vermilhas: The jay table was set up on October 3rd at an easy-to-reach point on the property and then filled with acorns. Of these oaks, a relatively high amount was damaged, either by *Curculio glandium* or by rot. At the time of setting up, there were some younger oaks in the immediate vicinity of the table with a height of about 3 - 5 m. A little further away at the edge of the property there are also substantial older and larger oaks.

The jay table was checked for the first time on October 11th. After comparing the pictures of October 3 and 11, it seems that the amount of acorns as a whole has decreased, albeit only slightly. Whether this is due to the jay remains unclear. After photographing the container from both sides, we removed so many acorns that about half of the container was still filled with old acorns. We refilled the rest of the container with fresh acorns, which we collected the Thursday evening, October the 7th, together with volunteers. With this method we wanted to find out, whether the jay,

in the case of having ever taken acorns, makes a difference between the new and the old acorns. Finally, we photographed the filled table again to be able to make a comparison of the levels of the tables at the next visit. The next time we visited, the day after the fires on October the 15th and October the 16th that happened in Carvalhal de Vermilhes, we unfortunately noticed, that in addition to all the vegetation, the jay table also burned almost completely to the ground. Only the stones for fixing the table and a piece of unburned wood enclosed by a metal cover remained. Unfortunately, this first jay table experiment ended prematurely.

To the jay table in Carvalhais: We set this jay table up on October the 7th as part of a volunteer campaign and filled it with acorns collected by volunteers on October the 5th. This jay table is located on a part of the property, which was burned in February 2017 by a controlled fire, in a shallow sink. About 30 meters downhill is a summer-dry watercourse. At this watercourse ends the burned part of the property and behind it grows mostly over three meters high Portuguese broom (*Cytisus striatus*). In the opposite direction and in the immediate vicinity of the approaching table there is still a lot of exposed mineral soil due to the fire. The already existing vegetation largely consists of approximately 30 cm high *Genista tridentata* / *Pterospartum tridentatum*.

The next visit to the table took place on the 26th of October. When comparing the pictures from October the 7th and October the 26th you can see that there were no or nearly no acorns taken. The acorns in the container were mostly very dry, some were damaged by *Curculio glandium*. Here we removed all acorns and refilled the container with acorns also collected on October the 5th that were stored since then and thus were not as dry.

#### 4. Discussion

Our observations so far show that the jay tables have not yet been used to the desired extent. At the jay table in Carvalhal de Vermilhes it is possible that some of the acorns were used to a small extent by jays. Unfortunately we can not be sure about that. Further observations could not be made due to the destruction of the jay table. For the sewing table in Carvalhal de Vermilhes I can think of the following reasons why the acorns were not used to the desired extent: First: The table was simply not accepted by the jays, the birds only used the acorns of the relatively close older oaks. Second: The first acorns with which we filled the jay table were to a large extent of poor quality and were therefore spurned by the jays. Because destruction of the jay table, it can unfortunately not be said whether the acorns we refilled the table with were used or not. Third: The composition of the litter and ground vegetation was not suitable and thus the jays did not use any acorns to bury. Fourth: It was too dry. Before the fires it did not rain for a long time. Both, the acorns and the soil could have been too dry.

The area in Carvalhais could also have similar problems: Because there isn't any shadow on the jay table for a long part of the day, the acorns dry out even faster. The soil is really dry and hot aswell. In addition, the surrounding area of the jay table is practically still a bare area, litter under which the acorns could be hidden is completely absent.

To conclude, jay tables on areas with no or only few amounts of vegetation, as they are common after fires and which also make up a remarkable part of properties managed by Montis' are likely to have little benefits. More important could be the use to transfer a pine or eucalyptus forest into an oak forest naturally. Nevertheless, in my opinion there are still benefits in having 1, 2 or more jay tables even if its just for showing the principal to visitors or to make further observations.