

## Of mice and oaks

### Of mice and oaks. Conditional outcomes in a seed-dispersal mutualism.

L Suselbeek 2014. PhD thesis. Wageningen University, Wageningen, the Netherlands.

Most of Lutra's readers will know Passive Integrated Transponder (PIT) tags, so-called chips, for monitoring pets and other animals or to study population dynamics. Suselbeek (2014) applies this technique on seeds of oak (*Quercus robur*) in order to track the dispersal of seeds and study the fate of seeds dispersed by scatter-hoarding rodents. This thesis focuses on seed-dispersal interactions between wood mice (*Apodemus sylvaticus*), bank vole (*Myodes glareolus*) and wild boar (*Sus scrofa*). Based on his results the use of PIT tags on acorns is a suitable, novel method to track the dispersal of acorns without rodents being able to remove the tags. Tags buried up to 30 cm were retrieved and used to show whether acorns were hoarded in larders or scattered.

After this first success an attempt was made to unravel the complex interactions between acorn production, survival and dispersal of acorns, hoarding behaviour of mice and competition with wild boar. This is not an easy task due to the large number of variables involved. Oak produces alternating rich and poor mast years. Hoarding and feeding behaviour of mice also varies as does population density. Wood mice and bank voles may function as mutualists of oak when scatter hoarding, or function as seed predators when larder hoarding or when recovering and eating acorn caches. Hoarding patterns of mice can vary between individuals and between populations, and the depredation rate of acorns may vary with mice density. Wild boar population dynamics is influenced by acorn production (Groot Bruinderink et al. 1994).

In autumn, and in winters of rich mast years, mast is the main constituent of the diet of wild boar. Body weight and condition induces the reproductive capacity in the succeeding spring of (sub)adults and they influence mortality of juveniles. Body weight and condition varies depending on acorn supplies and the availability of alternative forage such as broad-leaved grasses or seeds of beech (*Fagus sylvaticus*; also a stochastic mast producer). Numbers of wild boar can therefore show large stochastic fluctuations over the years and numbers vary between areas depending on the spatial distribution of resources. Depredation rates of acorns therefore depend on wild boar population density.

The results obtained by Suselbeek show that there is a large variation in hoarding patterns depending on acorn abundance. A field study was conducted in twelve sites, six in areas with a long history of wild boar presence and six without wild boar presence in the area. The study showed that intra- and interspecific competition for seeds between mice and wild boar increases seed-dispersal distance and seed spacing patterns, thereby increasing seed germination. Successful seed germination was most likely when acorn abundance was high and rodent abundance was high, regardless of wild boar presence. Seed germination was also relatively high with low acorn and mice abundance and wild boar absent. Although it is hypothesised in Suselbeek's thesis that patterns of hoarding are flexible and that they depend on the community of species and their abundances, effects of wild boar in shaping the mutualism between mice and oak was only marginally tested and detected in a controlled experiment. Probably this is due to the setup of experiments in an controlled environment with small outdoor arenas using six month old piglets from a semi-wild population in a 7 ha fenced natural area (Natuurpark Lelystad). Throughout the experiment the

boar were fed which might have influenced wild boar foraging strategies. The diet of free ranging wild boar varies between years, seasons or even days and the diet of piglets differs from adults (Groot Bruinderink et al. 1994, Baubet et al. 2003, Groot Bruinderink et al. 2009). Feeding behaviour of free ranging wild boar in a natural situation therefore might show different results.

The thesis highlights the necessity to study the complex interactions induced by stochastic fluctuations in seed production and population dynamics of wild boar and mice. In order to understand ecosystem functioning further studies focusing on the network of species involved are needed. Groot Bruinderink et al. (2009) also suggested that studies on free ranging wild boar are necessary to get more grip on the effect on the ecosystem of fluctuating numbers of wild boar. To assess the impact of wild boar on the successful germination of acorns will however need to incorporate even more variables. Wild boar do not only compete with mice as predators of seeds, but also impact the survival of oak by their rooting activity. Also beech as another mast producer plays a significant role on the habitat use, diet and condition of wild boar as does the distribution of resources. Long term field studies are therefore needed incorporat-

ing a large numbers of variables.

## References

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