

Potential for breeding white lupin for calcareous rich soils in the Netherlands

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State of art and aim: White lupin (*Lupinus albus*) can be an interesting crop for both organic and conventional farmers who are looking for leguminous crops to broaden their crop rotation scheme. Lupin is also of interest for food processors as a guaranteed GMO-free protein source for the replacement of soy. However, the available varieties ripen too late in the Netherlands. Furthermore, the largest areas suitable for arable farming are calcareous rich clayey soils. So, there is a need for early maturing calcium tolerant varieties. In 2010 and 2011, exploratory studies have been conducted with lines of white lupin from the Danish breeder Jørnsgård. The results were positive and the research was broadened in 2012 and 2013. In these years, also lines from the Dutch breeder, Van Mierlo from Globes Seeds, were included. In both years, field trials were conducted in four locations, mostly on calcareous rich clay soils with high pH. Measurements in both years included symptoms for calcium intolerance, soil coverage, plant length, earliness in flowering, earliness in ripening, yield and alkaloid levels. The goal was a broad evaluation of lines of white lupin for suitability for cultivation on clayey soils high in calcium content, in order to determine whether there is sufficient perspective for further breeder for both conventional and organic farming in the Netherlands.

Results and discussion: In total, 14 lines of a branching type, and 4 lines of a candle shape type (non-branching) were compared across four locations in the Netherlands during two seasons, 2012 and 2013. The branching lines came from the Danish breeder (Jørnsgård) and the non-branching lines from the Dutch breeder (Van Mierlo). The non-branching type has only one main branch with flowers and is supposed to ripen earlier and hence can be harvested earlier. The branching type has several branches with flowers, allowing it to close the canopy, also when plant density in the field is too low (because of harrowing or late night frost). Its disadvantage would be delayed ripening because of the difference in flowering between main and side branches. However, some early branching lines appeared earlier in ripening than the tested non-branching lines, although these early branching lines also appear to have lower yield potential. The comparison over four locations and two seasons showed clearly that soil quality and climate clearly influence plant growth. The branching type seemed somewhat more stable in growth than the non-branching type. There appeared to be no clear difference in yield potential between the two plant types. Together, these results show that it is feasible to develop a variety with a stable yield of 4 ton/ha (Nuijten and Prins, 2014). With a price of € 700/ton, this means sufficient return for growers. Of course, a higher yield is preferable. Various chain players have shown interest, for seed multiplication and processing. The market prospects for lupin for human consumption gradually increase. We see opportunities for breeding companies and processing companies to set up a production chain in the nearby future.

References:

Nuijten E, Prins U (2014) Witte lupin voor kalkrijke bodems: Onderzoek over twee jaar naar perspectievolle lijnen. Louis Bolk Instituut, Driebergen.

Tags: White lupin, calcareous rich soils, selection, breeding, production chains