Milk thistle – cultivation, breeding and primary processing in Austria

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Milk thistle (*Silybum marianum* [L.] Gaertn., Asteraceae) is an erect, annual, herbal plant growing fast to a height of appr. 2m and contains flowers with a higher number of purple composite flower heads. Fruits from milk thistles are an important starting material for extracts well established in its use against a number of liver problems. Although the species, native to the Mediterranean region, prefers higher temperatures for growing, it has meanwhile a long tradition of cultivation in Austria with large scale field production dating back to the 1980´s.

Austrian farmers start sowing in March-April, after soil temperature increase to more than 8°C with a seed quantity of 8-10 kg/ha. Milk thistle growing is speeding up after some weeks and covers the soil well, leaving no space for competing plants. In years with regular rainfall during May and June, the plants reach already heights of around 2 m and more and start to flower about end of June – beginning of July. Around 3 weeks later the Austrian farmers start already with the first phase harvesting by using large windrowing machines. After a few days of drying on the field, the second phase of harvest with a combined harvester started. Next step is artificial drying with an indirect heating system to reduce water content to below 8%. Later on, all the seeds are cleaned by using different systems like sieving, sifting and weight separation to reach a purity of min. 99% (Ph. Eur. Limit is > 98%). Now the drug Silybi mariani fructus is ready and undergoes quality control according to the requirements of the European Pharmacopoeia and/or customer requirements. After release, primary processing starts in Oberwaltenreith to prepare the drug for the upcoming extraction steps. In this phase, the seeds are squeezed by using a screw pressing unit especially adapted for this purpose. At this process the fatty oil content is reduced below a certain limit and additionally a special particle structure of the press cake is formed. At this last step before extraction the content of silymarin increases by separating the fatty oil to more than 4%. With the actual infrastructure in Austria a volume of 3.500 – 4.000 tons of seeds are processed by year.

Breeding work of *Silybum marianum* started in Austria already more than 20 years ago with cross breeding and selection steps on single plants. Major aims of current breeding work are seed yield, silymarin content, homogeneity during ripening time but also the stability of the plant to enable easier harvest. Milk thistle is a very strong plant with high tolerance against diseases, additional resistance breeding against plant diseases is not needed. More work has been invested in the creation of two different chemotypes based on the requests of pharmaceutical industry. One chemotype named „SD“ with silydianin reaching more than 60% of total silymarin content has been generated, but also the opposite chemotype „SB“ containing mainly silybin A and silybin B, but not silydianin at all. With these two chemotypes very different demands from the pharmaceutical industry are covered.