

On farm management of fodder beets in Germany

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Cultivation background

A high diversity of fodder beets existed already in Europe around the year 1850 (Vilmorin, 1923). A description of the different varieties used in Germany provided Scharfenberg (1962) (Fig. 1).

The production area has sharply declined in Germany from 565,350 ha in 1950 to 5,000 ha in 2005 (Röstel, 1999; Anonymous, 2006). This small seed market is shared by 7 breeding companies owning 19 protected varieties in 2006. The oldest variety still on the National List of registered varieties was released in 1955, the youngest in the year 2004 (Anonymous, 2006), indicating a very limited breeding activity nowadays. The crop may become a threatened one if the 30-years-trend of continuing decline of the production area cannot be stopped. Without doubts, decreasing economic importance of the crop will also diminish the extent of the within crop diversity managed by breeding companies.

Landrace description

The fodder beet is a wind-pollinated outbreeding crop which can vary largely in shape, size and colour as shown in Fig. 2. While a larger variation was accepted by the peasants at the Vogelsberg and Graben region, the obsolete variety „Frankes Rekord“ was selected by a home gardener to maintain the typical shape (Fig. 1, upper right corner) and skin colour (Fig. 3). With a shallow beet position in soil all four local types were very well suited for manual harvest.



Fig. 2

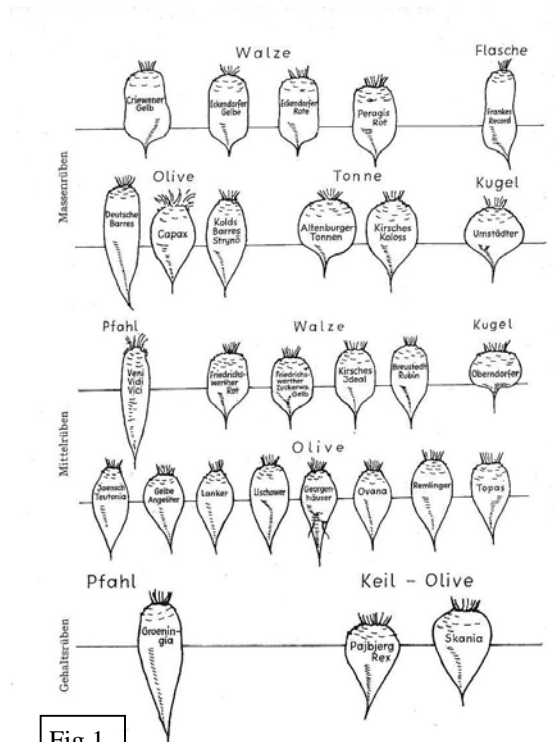


Fig. 1



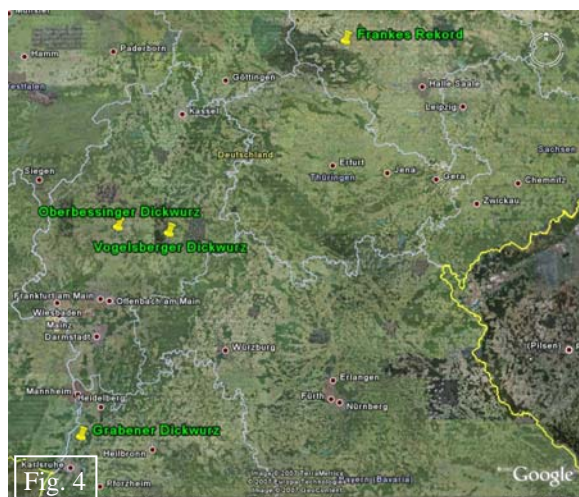
Fig. 3

In addition, the Oberbessinger and Vogelsberger Dickwurz seedlings produced more lateral roots, a trait that enabled peasants to cultivate the fodder beet in a sheltered garden place from where young plants were transferred into the production field. This cultivation method allowed them to produce fodder beets even on cooler sites such as around the villages Herchenhain, Grebenhain and Hartmannshain.

Landrace Conservation Case Study 1

Current landrace distribution

There are four places known in Germany where local types of fodder beets have been maintained by peasant families since several decades: two places in the state of Hessen (Oberbessinger and Vogelsberger Dickwurz), one in Baden-Württemberg (Grabener Dickwurz) and Sachsen-Anhalt (Frankes Rekord), respectively. The locations are shown in Fig. 4.



Threats to cultivation

A commercial seed production of the Frankes Rekord existed in the village of Rieder until 1959. There were approximately 20 small farmers who produced seed of this variety at a “good price”. The seed production was stopped after 1959 probably in consequence of the socialization of the agriculture.

The seed production of the Oberbessinger Dickwurz ceased in 1970 with the expansion of the maize crop though fodder beets were still grown until 1985. Before 1970 about 20 peasant families altogether produced 100 to 120 kg seed of this local type. The Oberbessinger Dickwurz was maintained by a single peasant to feed breeding pigs until the year 2001.

Changing economic conditions is the main threat to cultivation of landraces and obsolete varieties of fodder beets. Adverse effects of modern agriculture and society are counterbalanced to a very limited extent by on-farm management activities of mostly aged people valuing specific crop types inherited from their ancestors.

On-farm history

The local types (Grabener, Vogelsberger and Oberbessinger) are said to have been passed on from generation to generation since many decades. Official records prove that the obsolete variety “Frankes Rekord” exists since 1928 (Scharfenberg, 1962). The on-farm management of Frankes Rekord started after 1959.

A single family is reproducing the Grabener Dickwurz, a type that was adapted by selection through farmers since the introduction of fodder beets in the village area in the early 18th century.

The Vogelsberger Dickwurz is managed by aged peasant women at the villages Herchenhain, Grebenhain and Hartmannshain. They said that once in a while the Vogelsberger Dickwurz breeding population was mixed with plants they collected from fields of the lowland area. Hence, their „landrace“ is not a closed isolated population but an open system with influx of genes from outside. This report agrees well with the fact that peasants at Oberbessingen sold young plants to people of the Vogelsberg area once in a while. Fig. 5 provides a view from the Vogelsberg area into the basin of Frankfurt.



Landrace Conservation Case Study 1

Cultivation practice

The four fodder beet types are managed in a similar way. When the crop is harvested the „best“ beets are kept separate and stored in a basement or byre until spring. At Oberbessingen up to 500 plants were selected and replanted in April/May for seed production while only 10-12 plants were kept by each peasant at the Vogelsberg as well as the amateur gardener at Rieder. Sometimes the number of intermating individuals even dropped to 6 plants due to storage diseases. Though one could expect loss of variability due to genetic bottlenecks after such events the peasants reported that they had never observed inbreeding or reduced variation. It seems that inbreeding is effectively avoided by a) sporadic exchange of seed samples between the peasant families and b) bulking of seed samples of different cohorts before sowing as was reported for the Oberbessinger and Vogelsberger Dickwurz.



Seed plants are usually grown at a garden fence or fixed to posts in the field (Fig. 6), cultivated until 2/3 of the seeds reach maturity, lifted to accelerate the seed ripening process in August/September, kept under a roof shelter until completely dry and then threshed and cleaned (Fig. 7). As a single beet plant produces abundant amounts of seed one peasant cut most of the seed stalks of a bolting plant and left only one or two flowering stalks to reduce the seed quantity and to improve the seed quality. The seed viability can be tested by sowing a defined number of seed balls in a pot filled with soil, placed on the windowsill of the kitchen and kept moist for 7-14 days. The method is very simple but informative enough for on farm management of fodder beet germplasm. If properly dried and stored in twist off jars in a cool basement the fodder beet seeds remain viable more than 10 years. Obviously, the on farm management of locally adapted fodder beet germplasm is not too difficult if the basic equipments, facilities and skills are available.

Landrace Conservation Case Study 1

Landrace significance and potential use

The three cases of „landraces“ described here would meet the criteria for „conservation varieties“ as set out in the planned EU Commission Directive (draft working document of 27/03/2007, SANCO/3322/06rev 12) for conservation and amateur varieties. The Grabener, Oberbessinger, Vogelsberger Dickwurz and Frankes Rekord have a clearly defined geographic origin and are locally adapted. As the peasants still maintaining the germplasm are getting older, the populations would become extinct, if no one takes over the maintenance work which actually is not too demanding.

If a population is managed as a closed system such as in case of the Frankes Rekord, according to concepts of population genetics, the reproductive population size should never drop below 100 individuals to minimize loss of genetic variability. One hundred fodder beet plants can be grown on a field plot smaller than 50 m². If this plot is not available, the population can be split into lots of 10 plants grown by 10 persons and aliquots of the single plant seed yield can be mixed later. This is the main message from the study of the management system applied to the Vogelsberger Dickwurz which is of general interest to those engaged in the on farm management of an outbreeding crop. The on farm management of an outbreeding, space requiring species can be done in cooperation which also has a strong social component.

However, there is always a „but“. Fodder beets are grown to feed animals. If peasants abandon milk or meat production as their farms are no longer competitive then there is not a single good reason for a farmer to keep the traditionally used germplasm alive. Considering the fact that the acreage of fodder beet production dropped in Germany by 99% since 1950, the crop as such deserves our attention. Fodder beets have distinct advantages as cow forage as described by the milk farmer Th. Broich (BDP web site) who is producing the basal forage on his own farm. The energy produced per hectare by fodder beets equals 31,000 kg milk while maize silo yields 26,000 kg milk at maximum. Feeding fodder beets saves considerable amounts of concentrate feedstuff that is often imported. Nitrogen imported with the feedstuff ends up in our ecosystems. Animals that are fed with grass silo, fodder beet and concentrate produced on the farm where they live, will not cause this ecological problem (Reichholf, 2005) to that extent and can be marketed as a sustainable agricultural system product. We can thus argue that domestic fodder beet production assists implementing the National Sustainability Strategy. If this information on the potential role of fodder beets in our agro-ecosystem is transported from the regional farmer's associations into the public it can be a marketing advantage for the milk and meat production of this region. Fodder beets are also of interest for the ecological farming sector, forced to prove that their products are GMO free. Those, who may find it risky to grow maize as feedstuff in future, may wish to create and use GMO free own fodder beet germplasm.

Finally, if the Commission Directive for conservation varieties is approved then there is a chance for several geographic areas (Altenburg, Oberndorf, Remlingen, and others, see Fig. 1) in Germany to embark on fodder beet production again with the support of the EU. The future of the crop is perhaps brighter than we think today.

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