

Recent efforts in improving the genepool of annual caraway (*Carum carvi* L.)

Daniel Becker¹, Andrea Krähmer², Claudia Beleites², Bärbel Zeiger¹, Wolfram Junghanns³ and Frank Marthe¹

¹ Julius Kühn Institute, Institute for Breeding Research on Horticultural Crops, Quedlinburg

² Julius Kühn Institute, Institute for Ecological Chemistry, Plant Analysis and Stored Product Protection, Berlin

³ Dr. Junghanns GmbH, Aschersleben, OT Groß Schierstedt

E-mail of corresponding author: daniel.becker@julius-kuehn.de

Caraway fruits (achenes) are used for pharmaceuticals and as a spice. Due to essential oil content they remedies gastrointestinal afflictions. The main components of the essential oil are carvone ($\geq 50\%$) and limonene (30 – 45%). According to the European Pharmacopoeia (Ph. Eur.) an essential oil content of $\geq 3\%$ after distillation is required.

In Europe predominantly biennial cultivars are grown, although annual cultivars were already introduced in the 1990th. Initially, annual cultivars had a low essential oil content, but breeding activities succeeded in developing cultivars fulfilling the requirements of pharmacopoeia. However, annual cultivars fail to reach the level of yield and essential oil content of biennial caraway down to the present date. Therefore, an essential oil content of 5% and a yield of 1.5 t/ha were set as breeding goals. In addition, the proportion of stalked fruits (stalk-appendix) should be low, because this is an undesirable trait regarding processing and hence marketing.

The breeding material mainly originates from initial crossings between an annual

breeding line and essential oil-rich biennial cultivars. In 2018, all breeding lines (nearly 150 lines) reached an inbreeding level of I_5 .

Here we describe the investigation of 50 lines (including standards):

As most important trait for selection, we analysed essential oil content (including carvone and limonene content). Essential oil content was estimated using non-invasive near-infrared spectroscopy (NIRS). Predictions were based on a reference extraction: Extracts were analysed using gas-chromatography with flame ionization detector (GC-FID). Afterwards extraction values were corrected for distillation as required by Ph. Eur. Distillates also were analysed using GC-FID.

In addition, among other traits we observed stalk-appendix, thousand grain weight (TGW), single plant yield, height and flowering time. Here we will show selected results and correlations between the mentioned traits.

Best lines were selected for propagation to enable estimation of yield in future trials.