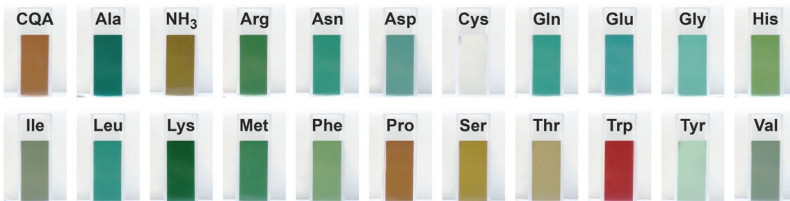


Verena Bongartz

Characterization of selected Polyphenol-Protein Interaction Products in alkaline-treated Sunflower Meal



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Declaration of contribution as co-author

The following co-authors contributed to the papers presented in Chapters 2 and 3:

Prof. Dr. Andreas Schieber contributed to the publications as the supervisor of this thesis and by proofreading all manuscripts.

Prof. Dr. Karl-Heinz Südekum assisted in the interpretation and publication of the results. As the corresponding author of chapter 3 he proofread the manuscript and handled the formal aspects of this publication.

Dr. Nadine Schulze-Kaysers assisted in the interpretation and publication of the results and by proofreading all manuscripts. As the corresponding author of chapter 2 she handled the formal aspects of this publication.

Dr. Benno F. Zimmermann assisted in the interpretation and publication of the results.

Christian Böttger assisted in the design of experimental work as well as the interpretation and publication of the results.

Nora Wilhelmy, Lisa Brandt and Mai Linh Gehrman assisted in the design of experimental work.



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Chapter 1: **General Introduction**

1 The sunflower (*Helianthus annuus* L)

1.1 Origin and proliferation

Helianthus (formerly *Annu*) is a genus of plants that contains approximately 70 species of sunflower in the Asteraceae. Although most species are perennial, section *Helianthus* includes more than 10 species most of which are annuals. The domesticated sunflower is derived from the wild form of *Helianthus annuus* L, or common sunflower [Schilling et al. 1998; Roth & Kormann, 2000].

Helianthus annuus L is native to North America. The wild form occurs throughout the continental United States, southern Canada, and northern Mexico. However, its prehistoric distribution is poorly understood. It is speculated that, prior to the arrival of *Homo sapiens*, the species was restricted to the south western United States. Native Americans used wild forms of *Helianthus annuus* L as a food, suggesting it became a camp-following weed and was thereby introduced to the central and eastern United States, where it was then domesticated [Heiser, 1951; Heiser et al., 1969].

Another theory states that buffaloes were the primary dispersal agents and that wild *Helianthus annuus* L had been widely distributed before the colonization of North America by humans. All modern domesticated sunflowers can be traced to a single center of domestication in eastern North America predating 3000 B.C. [Asch, 1993; Smith, 2011].

In the late 16th century, *Helianthus annuus* L – alongside beans and corn – was introduced to Europe by Spanish explorers, where it was cultivated as an ornamental plant. The commercial cultivation as an oil crop first started in Russia, around 1830. It resulted in high-oil lines with increasing oil contents from 28% to almost 50%. Today, *Helianthus annuus* L is cultivated throughout North and South America, Europe and Asia [Roth & Kormann, 2000; Lieberei & Reisdorff, 2007; Department of Agriculture, Forestry and Fisheries, 2010; FAOSTAT, 2016].