Nowadays, in many countries, an increase in the incidence of civilization diseases is observed. In order to resolve the problems caused by civilization diseases such as morbidity and premature mortality - the scientists actively seeking out the ways to support the human health which are characterized by relatively low costs, general acceptance and the wide availability. These requirements are fulfilled by fortified foods. Food fortification is the process of adding one or more biologically active compounds to the food product in order to provide the additional health-related benefits over than those resulting from its basic composition. Fortification of food products which are the part of the daily diet is applied to in order to improve the well-being, health of the consumers and reduce the risk of lifestyle diseases, among others.

Due to the fact that the plant phenolic compounds are characterized by safety in use in food products and multidirectional pro-health action they have the potential to be used as natural food additives. Besides the anti-inflammatory, immunomodulatory, antibacterial and antiviral activity of phenolic compounds a special role is attributed to their antioxidant activity. Phenolic compounds as natural antioxidants are able to support the protection of human body against the free radicals. Damage of important structures of human cells (proteins, lipids, nucleic acids, carbohydrates) caused by free radicals, are considered to be one of the main reason favoring the occurrence of diseases of lifestyle diseases such as cardiovascular disease, cancer, diabetes and neurodegenerative diseases.

One of the most important factor affecting on the effectiveness of food fortification (which is regarded as a ability of food product to the initiation of desired changes in the human body) is the bioaccessibility of health-promoting compounds. Bioaccessibility can be defined as a quantity of the substance introduced into the organism with food which is released from food during digestion process and becomes available for absorption. Bioaccessibility depends on the food composition, food technology and interaction between food components, among others.

The role of interactions between phenolic compounds and food matrix components can be considered in two aspects. The first one concerns the influence of the food matrix components on the bioaccessibility of phenolic compounds as bioactive food ingredients. Binding of polyphenols by food matrix can limit their bioavailability, which consequently decreases their desired activity. On the other hand, the interaction of polyphenols with nutrients may lead to formation of indigestible or only partially digestible complexes (eg. polyphenol-protein, polyphenol-starch), which resulting in decrease nutritional value of food.

The aim of the studies presented in the project is to gain a knowledge on the occurrence and significance of interactions between selected phenolic compounds and matrix of plant-origin food. The project are intended to provide informations about the type and mechanisms of interactions, factors affecting on the stability the formed complexes and their physicochemical properties. Moreover, studies involved in the project are aimed to determine the effect of interactions on the bioaccesibility of phenolic compounds and nutrients in *in vitro* conditions, as a factor affecting on the potential nutritional and prohealthy value of fortified foods.

General assumptions of the project includes analysis of the interaction between the selected single phenolic compounds (gallic acid, ferulic acid, chlorogenic acid, quercetin, apigenin and catechin), polyphenols from plant extracts (green tea and green coffee extracts) and isolated components of the food matrix (protein, starch, fiber isolated from the seeds of common bean) as well as whole food matrix (cooked, homogenized bean seeds). The study will include: determination of the occurrence and mechanisms of interactions, determination of the factors affecting on the stability of the formed complexes, determination of physicochemical properties of complexes, determination the effect of interactions on the in vitro bioaccessibility of the studied phenolic compounds and nutrients (protein/starch), determination of the effect of interactions on the potential pro-healthy properties based on the analysis of *in vitro* antioxidant activity. To achieve the objectives of the project electrophoretic, spectrophotometric, chromatographic and microscopic analytical techniques will be used.

In the long term, information concerning the mechanism and the role of the interactions between the food matrix and bioactive components may be used during designing functional products with a desired bioaccessibility of nutritional and nutraceutical compounds, which may play a role in the diets preventing aginst civilization diseases. The base of knowledge provided by the project will contribute to the development of the food science with a particular emphasis on issues related with food fortification.