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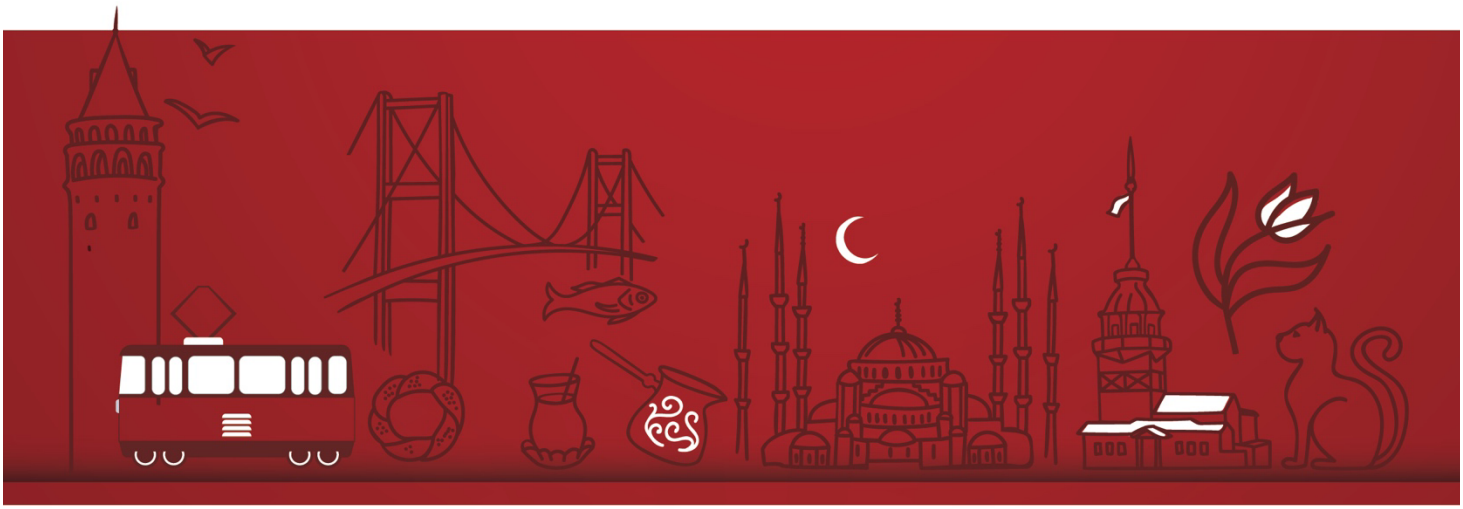
ABSTRACT BOOK



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Successful Preservation of *Helichrysum plicatum* L. Flowers Extract Using Novel Carriers by Spray Drying Method

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Research hypothesis: Everlasting flowers (genus *Helichrysum*) represent a significant source of pharmacologically active secondary metabolites (flavonoids naringenin, kaempferol, apigenin) related to proven spasmolytic, antioxidant, and antimicrobial activity. A critical point in development of polyphenol rich extracts of *H. plicatum* is their limited stability, which can be solved using microencapsulation technique spray drying.

Method : *Helichrysum* flower extract was spray dried using four different carriers, and their combinations. Besides the conventional ones (maltodextrin-MD, whey protein-WP, 20%, w/w), innovative carriers, cyclodextrins (beta-cyclodextrin-BCD, hydroxy-propyl-beta-cyclodextrin-HPCD, 15%, w/w) have been proposed to overcome the extract limitations. The liquid feed was spray dried in a Labtex ESDTi spray dryer, under following conditions: inlet 130 ± 5°C and outlet 70 ± 5°C temperatures, spraying air flow rate (75 m^3/h), liquid feed (11 mL/min rate), atomization pressure (2 bar). The spray-dried *Helichrysum* extract (HE) was obtained and used for further analyses: total polyphenols and flavonoids contents, spectrophotometrically and individual components by HPLC method. The dried extracts were stored in brown glass tubes for 6 months under room temperature in order to determine changes in the content of total and individual compounds during period of real storage. Samples were placed at in stability chamber (Memmert, Schwabach, Germany), in the absence of light, during one month in order to determine the effect of storage during accelerated stability test. All experiments were executed in triplicates. One-way ANOVA was conducted to test the individual factors AND Duncan *post hoc* test for differences between the mean values detection (STATISTICA v.7.0.3, MS Office Excel v. 2010).

Results : Obtained powders manifested high encapsulation efficiency (more than 80%), confirming spray drying as adequate microencapsulation technique. Spray dried HE, without a carrier addition, exhibited 97.32% and powders microencapsulated using carriers ranged from 80.07 (HE+HPCD+MD) to 96.45% (HE+HPCD) of EE%, suggesting HEs active compounds are successfully microencapsulated into examined carriers. Spray-dried HE exhibited 106.32 mg GAE/g of polyphenol content, and powders produced using different polymers ranged from 83.25 (HE+HPCD+WP) to 100.28 mg GAE/g (HE+HPCD). The highest total flavonoids content was achieved in spray-dried HE. Among powders obtained using carriers, total flavonoids ranged from 15.66 (HE+HPCD+WP) to 21.55 (HE+HPCD) mg catechin/g. HPCD complexes exhibited the highest polyphenols and flavonoids content. Results of HPLC method confirmed that mainly presented flavonoids in obtained powders were naringenin, kaempferol, quercitrin, isoquercitrin, apigenin, and apigenin and naringenin derivates. Kaempferol-3-O-glycoside was the most dominant compound presented in all tested samples. Analysis of total polyphenols, flavonoids and individual compounds were carried after one

month of accelerated and 6 months of real storage conditions. After one-month, total polyphenols and flavonoids increased in all examined samples. During the accelerated storage, water migrate from CDs and other carrier complexes, resulting the higher concentration. After 6 months, total polyphenols and flavonoids increased compared to the contents before storage tests, while decreased compared to 30 days without statistical significance. Content of individual compounds did not decrease significantly after 6 months, indicating that process of spray drying was suitable for stabilization of HE active compounds and indicating good preservation using polymers.

Discussion : Spray drying of *Helichrysum* flower extract to obtain powders with high retention of bioactive compounds was evaluated. All microencapsulated bioactive principles reached high content and preservation during storage, based on good preservation. This could be important for further use in pharmaceutical and food industry due to its confirmed health benefits.