

Abstract

Date seed is one of the wastes of the date industry, which, despite the presence of important chemical compounds, appropriate measures have not been taken to create added value for these wastes. Dates are a rich source of polyphenolic compounds, which, in addition to antioxidant properties, also have colored essence and can be used industrially to produce dye extracts. But few sources mentioned the color properties of date seeds. As a result, in this research, we decided to study the extraction of color-forming compounds in date seeds and to investigate the effect of different parameters such as temperature, pH, storage conditions, etc. on the intensity and stability of the resulting color. In the following, the use of dye extract in the textile industry was briefly examined. The extraction efficiency of phenolic compounds from raw date seed powder was estimated to be about 0.4-3.5%, the content of total phenol, total flavonoid, DPPH radical inhibition power and iron reduction in date kernel phenolic powder were about 18.82 mg, respectively. Gallic acid in 100 mg of powder, 11 mg of quercetin in 100 mg of powder, 10.90 mg of trolox in 100 mg of powder and 105.40 mg of iron II in 100 mg of powder were obtained. Some of the phenolic compounds in date kernel phenolic powder were identified by HPLC method, and catechin, 3,4-dihydrobenzoic acid, 5,2-dihydrobenzoic acid and apigenin were identified as the main compounds. Quercetin, apigenin and rutin were ranked next. The total count of microorganisms in the colored extract showed that the samples were at a low level in terms of general contamination, also the colored extract of date kernel has an inhibitory effect on *Staphylococcus aureus*. In such a way that in the presence of the extract, the growth of bacteria decreased to $15 \pm 3.1\%$. The UV-visible spectrum recorded for the phenolic extract of palm seed showed that the main absorption occurred in the UV region, especially at 263 nm. However, in the visible range, the maximum absorption was recorded at 400 nm. The findings of infrared spectroscopy of date seeds phenolic powder confirmed the presence of phenolic compounds in the powder extracted from date seeds. The results of the present research showed that the change of pH and the effect of heat treatment on the properties of the extract such as color, phenol and flavonoid content and the amount of absorption at 400 nm have a significant effect. and were dyed. Sample 1 (without mordant) had a higher L^* value than sample 2 (with mordant). The amount of a^* and b^* in sample 1 was higher than 2. However, chroma (C^*), which shows the purity of color, was calculated in sample 1 with a rate of 19.65 slightly higher than sample 2. The highest value of color strength (K/S) belonged to sample 2 with a value of 3.86. While in sample 1, the color strength was 1.13. These results show the effect of serration in increasing the color strength of dyed samples. The results of the color stability test indicate more abrasion stability in the sample without mordant. Regarding optical stability, a low value of 2 was reported in both samples.

Key word: Date seeds, Natural dye, Waste, Phenolic compounds, Dyeing, Cotton fibers, Mordant