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CHEMICAL COMPOSITION, STRUCTURAL CHARACTERISTICS, AND JELLYING CAPACITY OF SUNFLOWER PECTINGS

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Some 40 years ago, S.Stojkov (1948) found that the sunflower receptacle contains up to 22% of pectins. Numerous investigations conducted subsequently have shown that the sunflower receptacle, depending on variety, elimatic conditions, and date of harvest, contains 15 to 25% of pectins which may be used as a natural substance for jellying.

More recent studies conducted in Canada by Lin et al. (1975,1976) and Kim et al. (1978) indicated that the threshed and dried sunflower receptacle contains a water-soluble fraction of high-esterified pectings and the main water-insoluble fraction of lowesterified pectins. They also found that the sunflower pectins contain amide groups (0.4 to 0.7%) and acetyl groups (1.9%) which affect negatively the jellying capacity. These groups usually do not occur in natural pectins.

To chenk the results of the Canadian researchers, we analyzed the chemical composition, structural characteristics, and jellying capacity of sunflower pectins isolated from threshed and dried receptacles of sunflower hybrids NS-H-26-RM, NS-H-27-RM, and NS-H-33-RM. The analyses confirmed the findings of the Canadian researchers and further showed the following.

1. The extraction procedure of pectin fractions from the basic material, the ultrafiltration of the obtained pectin extracts, the sedimentation of pectins from the refined extracts by alcohol, further refinement and vacuum drying produced the following average yields of pecting :

I. the fraction of high-esterified pectins	4.1%
II.the fraction of low-esterified pectins	11.3%
Total yield of pecting fractions I and II	15.4%

2. Fraction I, the high-esterified sunflower pectins had the esterification rate of 78.9%, 0.21% of amide groups, 1.48% of acetyl groups, and the relative molecular mass of only 68.000. This fraction consisted of partially decomposed pectins incapable of starting the process of jellying when combined with 60% of sugar and 0.35% of citric acid. Thus, this fraction of sunflower pectins, with a low yield (only 4%), may be discarded from the production of sunflower pectins.

3. Fraction II, the low-esterified sunflower pectins had the esterification rate of 38.3%, 0.35% of amide groups, 1.37% of acetyl groups, and the relative molecular mass of 153.390%. The boiling of 1% of low-esterified sunflower pectins, 30% of fructose, 0.35% of citric acid, and calcium salts produced a pectin gel of standard density of 50 mbars, determined by a pectinmeter after Šulc (1983).

3. An amidification of the low-esterified sunflower pectins II by ammonified alcohol (pH 14, 2^{O}C) for 12 hours reduced the esterification rate to 31.5%, acetyl groups to only 0.38%, while the content of amide groups was increased to 12,5%. The reduction of the acetyl groups and the increase in the content of the amide groups brought a considerable increase in the jellying capacity of the amidified low-esterified sunflower pectins which, boiled with 30% of fructose and 0.35% of citric acid rendered a pectin gel of the density of 105 mbars, determined by a pectinmeter after Šulc (1983).

5. It may be concluded for the production of pectins from threshed and dried sunflower receptacles, that fraction I of the decomposed high-esterified pectins with a low yield may be rejected, fraction II of the low-esterified sunflower pecting should be amidified in order to use them as a natural jellying substance applicable in the production of dietetic and diabetic jellied food proparations. Compared with amidified apple and citrus pectins, the quality of amidified sunflower pectin is somewhat inferior while the procedure of production of sunflower pectin is more complicated and more expensive.

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