Peanut Science (1983) 10:82-84

Improved Methods for Removing Oil from "Difficult-to-Press" Peanuts[1]

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ABSTRACT

In pressing peanuts for subsequent use in partially defatted products, the oil is difficult to remove in certain lots of peanuts. New laboratory procedures showed increased yields of oil can be obtained from "difficult-to-press" (DTP) peanuts by mixing them with "easy-to-press" (ETP) peanuts on a 50-50 basis or by drying them to a moisture level between 4.3 and 4.7%. Oil yields by pressing are little affected when peanuts are stored at temperatures of 4.4 (40F) and 23.9C (75F) for periods of up to 12 months.

Key Words: Easy-to-press, difficult-to-press-peanuts, oil removed, storage

Peanuts are commercially cage-pressed for subsequent use in the production of partially defatted peanuts, partially defatted flours and other products (4,5). For unknown reasons, sufficient oil (55%) can not be removed from occasional lots of peanuts. Suspected causes for insufficient oil removal include peanut variety, growing conditions, splits, maturity, and storage time after harvesting. However, previous work showed that peanuts containing less than 50% splits had no significant effect on oil removal (4). Peanuts that are cage-pressed for oil removal usually contain considerably less than 50% splits. Although basic causes for "difficult-to-press" peanuts are yet to be determined, this paper reports new practical procedures developed on a laboratory scale for pressing "difficult-to-press" peanuts to improve oil yields to a level comparable to that obtained with "easy-to-press" peanuts. The effects of storage time of peanuts on oil removal is also reported.

Materials and Procedures

For tests with "difficult-to-press" (DTP) peanuts the following commercially spin-blanched peanuts were used (a) "easy-to-press" (ETP) jumbo runner peanuts with 5.1% moisture, 50.9% oil and 24% splits, and (b) "difficult-to-press" (DTP) medium virginia peanuts with 5.6% moisture, 48.4% oil and 19.4% splits. Both lots of peanuts were harvested in 1978.

For storage tests at 4.4 (40F) and 23.9C (75F) peanuts used were (a) jumbo runner peanuts with 4.9% moisture, 50.0% oil and 35.7% splits, and (b) medium virginia peanuts with 5.0% moisture, 49.3% oil and 34.5% splits (1,2). Both lots of peanuts which were harvested in 1979, were commercially spin-blanched ETP peanuts.

Pressing tests were conducted in a 10.9 MT (12 ton) Fred S. Carver Laboratory Cage Press using a 8.89 cm (3-1/2 inch) diameter slotted-mold cylinder (3). In all tests 600 g (1.32 lb) of peanuts placed in cheese cloth were pressed for a total time of 30 min. at a maximum gage pressure of 13.8×10^7 pa (2000 psig) at 23.9C (75F). Maximum pressure was reached within one min. For each test there were two replicates. Prior to pressing, peanuts stored at 4.4C (40F) were equilibrated for 24 hours at 23.9C (75F). The difference in weight before and after pressing determined the amount of oil removal. The percentage of oil removed was based on the oil content of the unpressed peanuts.

Results and Discussion

Previous work (4) has shown that laboratory cage pres-

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sings remove more oil from peanuts than large commercial cage pressings under similar conditions. However, variables that influence oil removal on a laboratory scale also influence oil removal during commercial scale pressing. For this work, peanuts were obtained from a lot of peanuts that were "difficult-to-press" on a commercial scale – that is, an insufficient amount of oil was removed even in extended pressing times of up to 60 min. In the commercial cage presses, 45.2% oil was removed when over 55% oil removal was required. Laboratory pressing resulted in 57.3% oil removal.

Figure 1 shows oil yields obtained after pressing various mixtures of ETP and DTP peanuts for 30 min. at 13.8 x 10^7 Pa (2000 psig). For 100% DTP peanuts, 57.3% oil was removed; for a mixture of 75% DTP peanuts with 25% ETP peanuts, 60.6% oil was removed; for a mixture of 50% of each, 66.9% oil was removed; and for 100% ETP peanuts, 66.9% oil was removed. The mixture

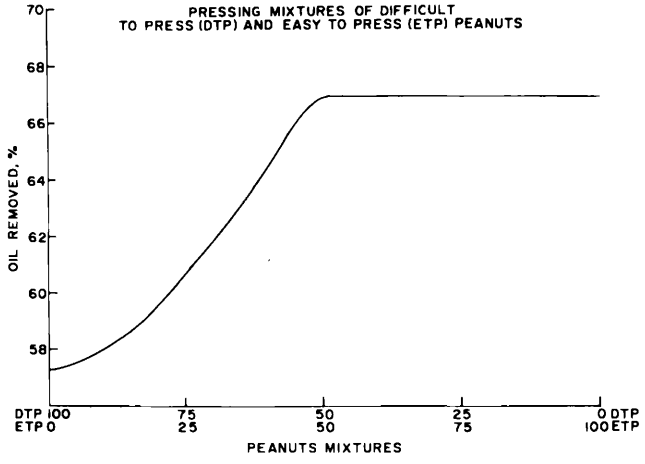

Fig. 1. Effects of Easy-to-Press peanuts on removing oil from Difficult-to-Press peanuts.

containing 50% DTP peanuts yielded as much oil as the 100% ETP peanuts. The increase in oil yield comes from the DTP peanuts. Statistical analysis of the data by analysis of variance showed effects of mixing the ETP peanuts with the DTP for increasing oil yields to be significant at the 99% level. The data indicated that compressability and spacing arrangement of the peanuts being pressed probably affect the amount of oil removed during pressing.

In addition, it was found that drying the DTP peanuts, at 5.6% moisture to a lower moisture level, increased the amount of oil that could be expressed. Normally, peanuts are dried to 5.0 to 6.0% moisture for optimum oil removal (3). Figure 2 shows that when DTP peanuts were dried from 5.6% to moistures ranging from 4.3 to 4.7% oil, oil yields increased from 57.3% to 68.7%, an 11.4% increase. Statistical analysis of the data by analysis of variance showed moisture effects on oil yields to be significant at the 99% level.

Pressed DTP peanuts with 45.0 to 57.3% of the oil removed had a glassy, oil-spotted surface appearance while ETP peanuts had a uniformly white appearance. However, DTP peanuts with 68.7% of the oil removed also had a uniform white surface appearance. Oil-roasted partially defatted peanuts (5) prepared from pressed DTP

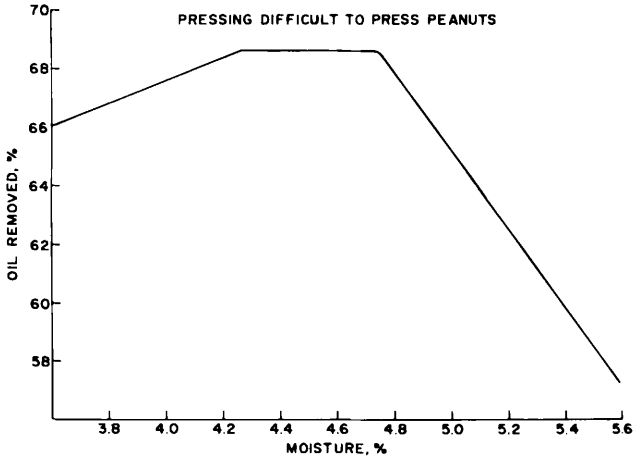

Fig. 2. Effects of moisture on removal of oil from Difficult-to-Press peanuts.

peanuts with 55.5% removed had a surface appearance which is considered normal for similar products prepared from ETP peanuts. This was also true for oil-roasted partially defatted peanuts prepared from pressed DTP peanuts with 68.7% of the oil removed.

Studies were conducted to determine the effects of storage time of peanuts on oil removal. Commercially blanched medium virginia and jumbo runner peanuts were stored at 4.4 (40F) and 23.9C (75F) for 12 months. Table 1a shows the effects of storage on medium virginia peanuts. It is to be noted that "0 storage time" was actually taken at approximately 1 to 2 months after harvesting the peanuts. Analysis of variance of the data showed that the effects of storage temperatures of 4.4 (40F) and 23.9C (75F) were not significant. Time was significant at a 99% level, however, the increase of 1.7% in oil removal in 12 months was so small that for practical applications, no significant increase in oil removal occurred.

Table 1. Effects of Storage of Peanuts on Oil Removal[1].

	Storage Temp. °C (°F)	% Oil Removed, Storage Time, Months 0	3	6	9	12	Mean
a. Medium Virginia Peanuts	4.4 (40°)	67.9	70.1	69.5	68.7	69.4	69.1
	23.9 (75°)	67.9	68.6	69.5	68.9	69.9	69.0
	Mean	67.9	69.4	69.5	68.8	69.6	69.0
b. Jumbo Runner Peanuts	4.4 (40)	66.1	68.2	69.1	68.0	67.3	67.7
	23.9 (75)	66.1	66.2	68.4	67.9	68.2	67.4
	Mean	66.1	67.2	68.8	67.9	67.8	67.6

1/ Pressing 30 min at 23.9°C (75°F) and at gage pressure of 13.8 x 10^7 Pa (2000 psig)

Table 1b shows the effects of storing jumbo runner peanuts for 12 months. These peanuts also had a "0 storage time" approximately 1 to 2 months after harvesting. Storage results were the same as for the medium virginia peanuts. Analysis of variance showed that the effects of temperature were not significant. Time again was significant at a 99% level, but the increase of oil removal of

1.7% was again so small that for practical applications no increase in oil removal occurred in 12 months.

Summary

Peanuts are hydraulically cage-pressed for subsequent use in the production of partially defatted peanuts, partially defatted flours and other products. In certain lots of peanuts, the oil is not removed readily. New procedures were developed on a laboratory scale for pressing these "difficult-to-press" (DTP) peanuts to increase the oil yields to a level comparable to that of "easy-to-press" (ETP) peanuts. Pressing tests showed that the amount of oil removed from DTP peanuts can be increased by mixing these peanuts with ETP peanuts on a 50-50 basis prior to pressing. The data indicate that compressability and spacing arrangement of the peanuts being pressed probably affect the amount of oil removed. Drying the DTP peanuts to a lower moisture level also increased the amount of oil that could be removed by pressing. When DTP peanuts at 5.6% moisture were dried to moistures ranging from 4.3 to 4.7%, oil yields during pressing increased from 57.3% to 68.7%. Storage of peanuts at 4.4 (40F) and 23.9C (75F) for 0, 3, 6, and 12 months showed no practical significant differences in oil removal.

Acknowledgement

Statistical evaluations reported were conducted by Steven Buco and Mrs. Eva D'Arcangelo.

Literature Cited

1. Mehlenbacher, V. C. 1960. The Analysis of Fats and Oil. The Garrad Press, Champaign, Ill.
2. Official and Tentative Methods of the American Oil Chemists' Society, 3rd Edition, Ab2-49.
3. Pominski, J., H. M. Pearce, Jr., and J. J. Spadaro. 1970. Partially Defatted Peanuts - Factors Affecting Oil Removal During Pressing. Food Technol., 24(6):92-94.
4. Pominski, J., J. J. Spadaro, and J. R. Baxley. 1980. Pressing Peanuts - Effects of Splits on Oil Removal, Proc. Amer. Peanut Res. Educ. Soc. 12(1):3-12.
5. Vix, H. L. E., J. Pominski, H. M. Pearce, Jr., and J. J. Spadaro. 1967. Development and Potential of Partially Defatted Peanuts. Peanut J. Nut World, 46(*3*):10-11; 46(*4*):10-11, 18; 46(*6*):10-11.

Accepted October 21, 1983