PROCESS AND PRODUCT RESEARCH ON DRIED FRUITS

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We have previously reported on finding a way to keep ground raisins from hardening. The treatment used was to heat the ground paste at 120°F for 2 days. This treatment provided a soft paste that did not harden or set even after 6 months, in contrast to the untreated control that set to a hard mass within 15 days. Also reported was a reliable technique, using a modified shear press, to measure the consistency of the paste so as to be able to obtain meaningful and reproduceable results. The relationship between taste panel subjective evaluation and shear press readings in lbs. is shown in Fig. 1. As the subjective score increases, or as the paste becomes harder, the shear press readings become correspondingly higher. A subjective score at about 2-1/3 was considered the limit for a product to be regarded as spreadable; this corresponds to a shear press reading of around 800 lbs. Fig. 2 shows comparative softness of treated and untreated paste, where the untreated raisin paste in about one month, easily supports a 2 Kg weight and gives a shear reading of around 1400 lbs. On the other hand, the heat-treated paste is easily mashed by the 2 Kg weight after a month's storage and would give a reading of only about 600 lbs.

In heating a large mass, for instance a 50 lb. box of raisin paste, considerable time is required before the center comes up to temperature. Preliminary work has proved the feasibility of reproducing laboratory results in a semifactory scale test, but this procedure was time-consuming, thus to circumvent this problem, the paste should perhaps be heated before being packed. A study was initiated to shorten the time required for treatment. A procedure was developed in which a double-drum drier was used to heat the paste (see Fig. 3). By this method, the ground raisins fall directly from the grinder onto the rotating heated double drums. The raisin paste is scraped off the drums with doctor blades and falls into the packaging cartons. In this treatment some of the variables are: drum temperature, drum speed, spacing of the drums, and location of doctor blades. Good results have been obtained with a 40 second and 8-1/2 second contact time (Figures 4 and 5). Even though there is some moisture loss, there is no increase in hardness.

The heat treatment technique, thus, is highly adaptable to commercial operation. A cost estimate for unpackaged paste, which included charges for labor, utilities, insurance, taxes, maintenance, repairs, interest on fixed capital, and depreciation for a 1500 lb. per hour operation, gave a cost of about 0.6 cents per pound. Heating the whole raisins before grinding and then grinding the hot raisins is now being studied. This could eliminate the use of drum drier and should cut the cost per pound substantially.

Other Research

New product research is always of interest to producers and much time and effort could be spent on the investigation of new products. From our studies, we would like to present a few examples.

Raisin paste is a natural for new product development. One can probably visualize a number of ways in which it could be successfully marketed. Some products prepared in our laboratory are shown in Fig. 6. Bakeries, both small and large, could use this paste in numerous ways: in cookies, coffee cakes, pies (raisin, mince, pecan, etc.), in rolls, etc.

Another type of product that we have worked on is jelled dried fruit products. They can be warmed by the housewife and poured into molds for use on salads and in desserts. A typical example is jelled prune juice and jelled prune puree, Fig. 7. Other jelled products that we have prepared are jelled fig juice and purees, a whole raisin sauce, raisin-pineapple, and a number of others. Gelling is accomplished by adding low methoxy pectin and sufficient calcium ion, thus large amounts of sugar are not required. Some of these such as jelled prune juice have definite possibilities, along the line of cranberry sauce, for use with meals. Also we have experimentally produced foam-mat and vacuum dried fruit powders (Fig. 8). These light-weight, easily reconstituted products have many possibilities.

Convenience is the keynote of our present age. One type of new product that we have investigated fits well in the convenience category; dried fruit toppings in pressurized cans, such as used for whipped cream. The whole principle behind pressurized cans is to obtain a foamy product that is stable. Foams were made from pitted prunes, raisins, figs, and apricots. In some instances 2% albumin was added to increase the foam stability. Fig. 9 shows two representative samples of raisin foam and apricot foam. These foams were stable for at least 1/2 hr. The canned product has good storage life as long as it is refrigerated. Samples that were kept for over 2 years are still good. This type of product could be marketed along with whipped creams and dairy products, and should have good consumer acceptance.

SO_2 Migration in Compotes

Some countries have strict regulations on sulfur dioxide content of dried fruits that enter their country. One such regulation stipulates that sulfured prunes will not be allowed to enter. This does not present a problem unless prunes are packaged with other sulfured cut fruits and then shipped, such as in a dried fruit compote or mix. When this compote is opened at a later date, all fruits are found to contain sulfur dioxide, including prunes. We initiated a study to show that the prunes were not sulfured initially but that the SO_2 migrated from the cut fruits into the prunes. The individual fruits were analyzed initially for moisture and SO_2 then mixed and packaged. The proportions in the compote studied were approximately:

Prunes	40%
Peaches	30%
Apricots	15%
Pears	15%

The packages of compote were stored at 90° and 70°F and then removed periodically and analyzed individually for SO_2 and moisture. At 90°F prunes absorbed over 900 ppm SO_2 after only 3 weeks' storage and then equilibrated with the cut fruits by the 4th week. By the 5th week the SO_2 levels were all within 100 ppm of each other (Fig. 10). A similar curve was obtained at 70° (Fig. 11).

These tests indicate how unsulfured prunes absorb SO_2 from cut sulfured fruit that is packaged with them and the data could be utilized by the industry as proof when questions arise by regulatory agencies in foreign countries regarding SO_2 content of prunes in dried fruit compotes.

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(June 15, 1964)

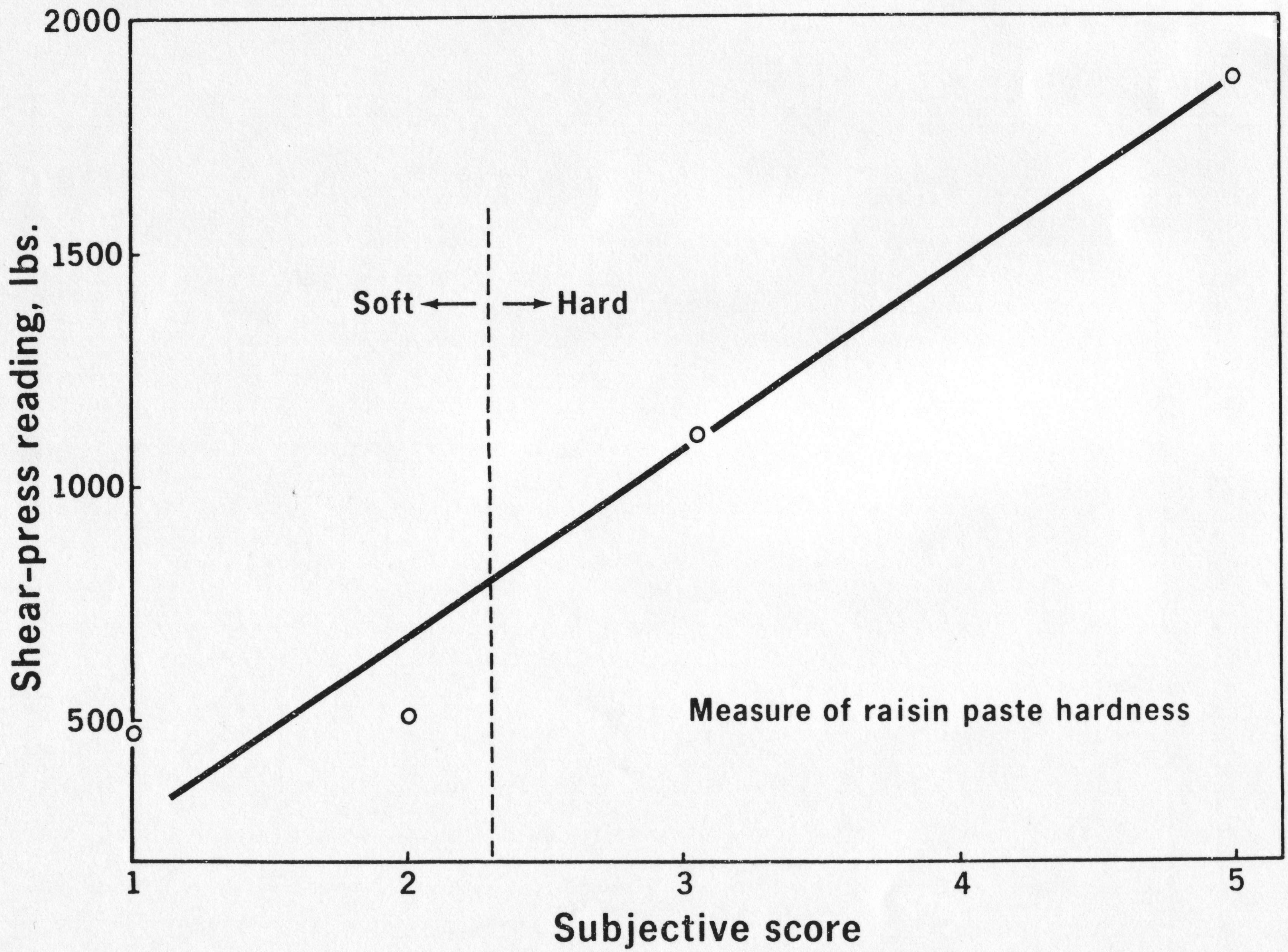

Fig. 1. Comparison of Subjective Evaluation and Shear Press Readings.

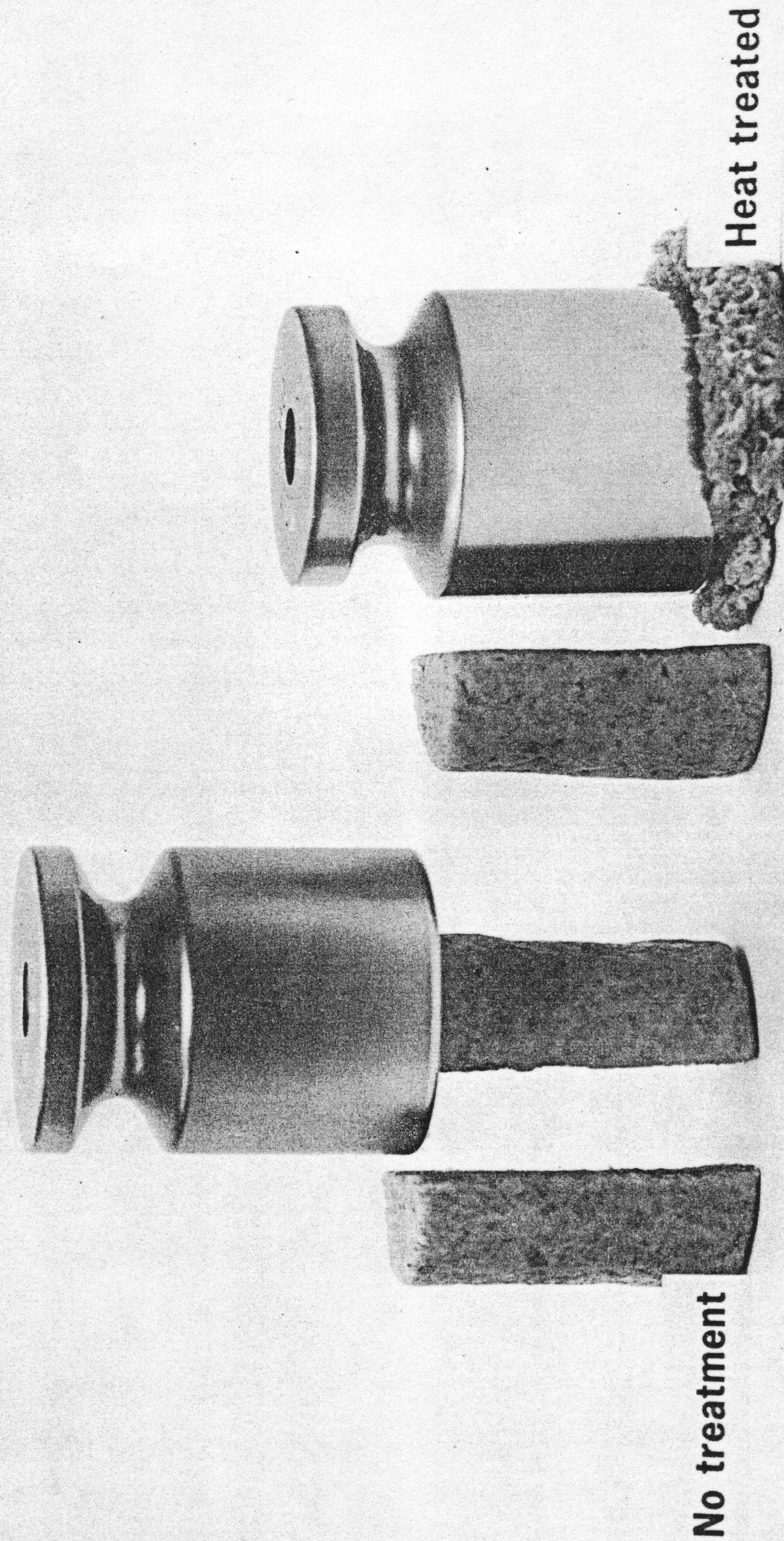

Fig. 2. Comparison of Treated and Untreated Raisin Paste.

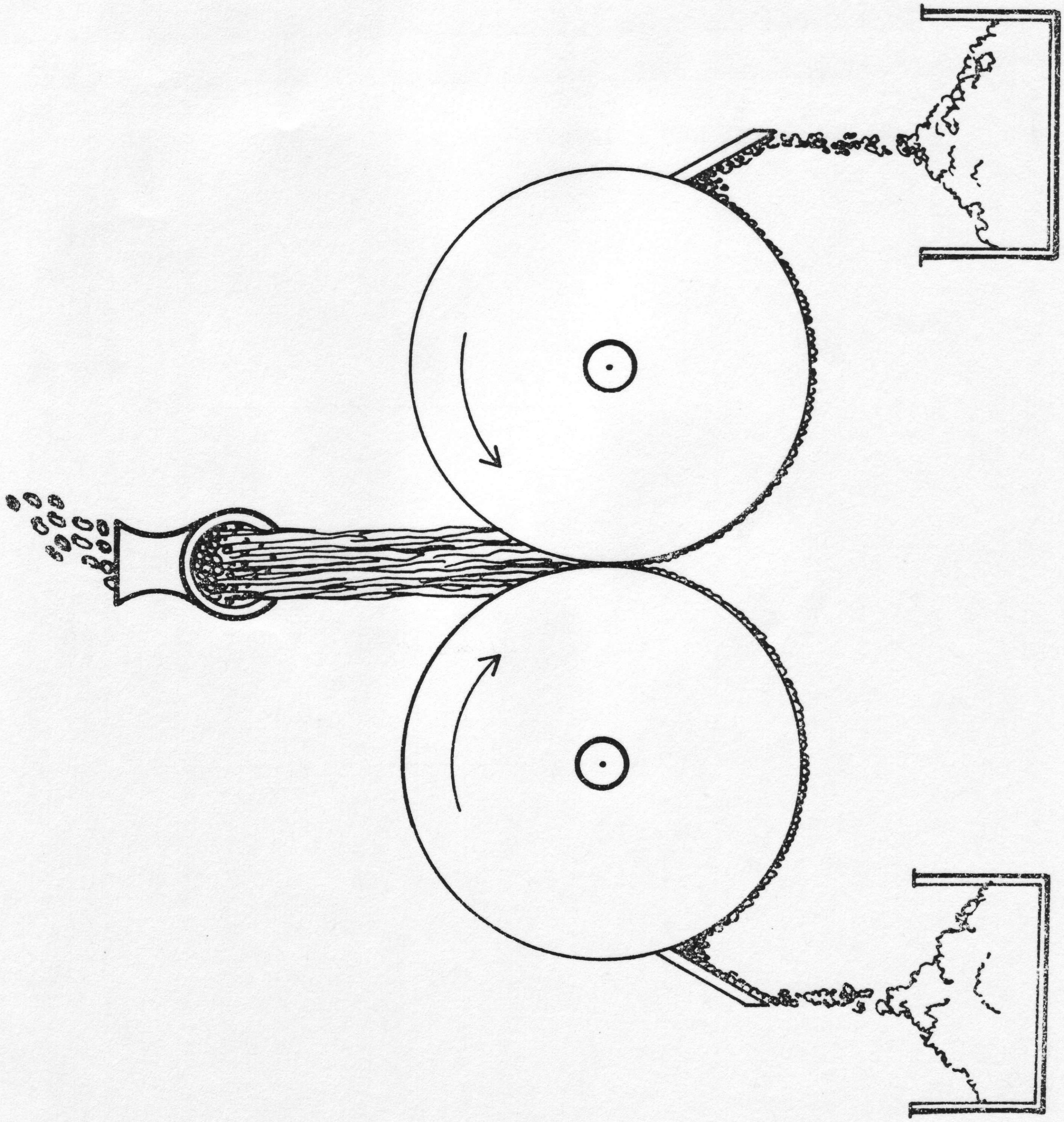

Fig. 3. Double-drum Drier.

RAISIN PASTE CONSISTENCY AFTER 90 DAYS STORAGE

Treatment	Moisture %	Force lbs
None	15.0	1410
40 sec - 200°F drums	13.5	650

Fig. 4. Paste Consistency After 90 days Storage - 40 sec. contact time.

RAISIN PASTE CONSISTENCY AFTER 30 DAYS STORAGE

Treatment	Moisture, %	Force, lb
None	16.2	1170
8-1/2 sec, 200^{o} drums	14.9	605

Fig. 5. Paste Consistence After 90 days Storage - $8\frac{1}{2}$ sec. contact time.

Fig. 6. Products Prepared with Raisin Paste.

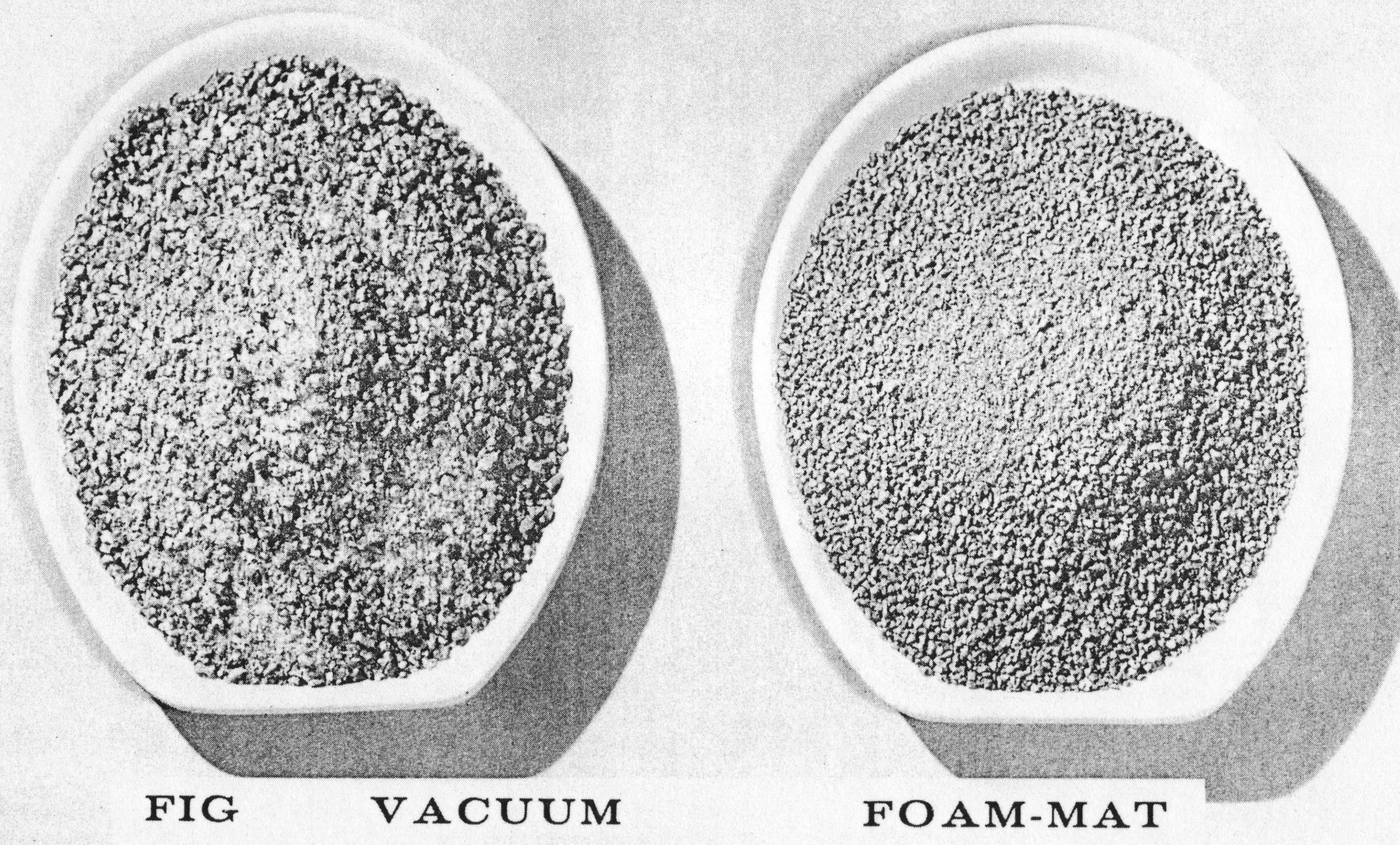

Fig. 8. Foam-Mat and Vacuum Dried Fig Powder.

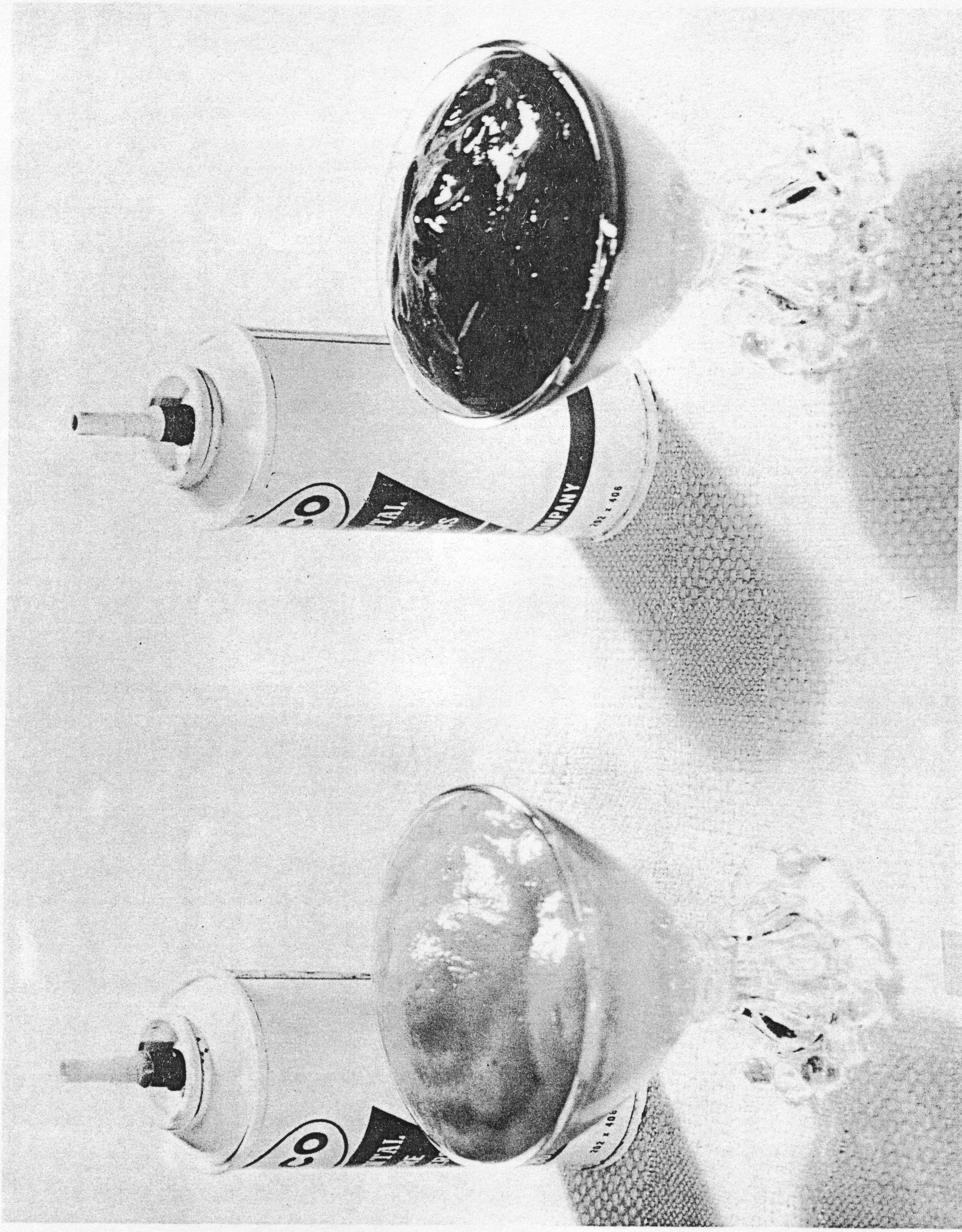

Fig. 9. Apricot and Raisin Foams.

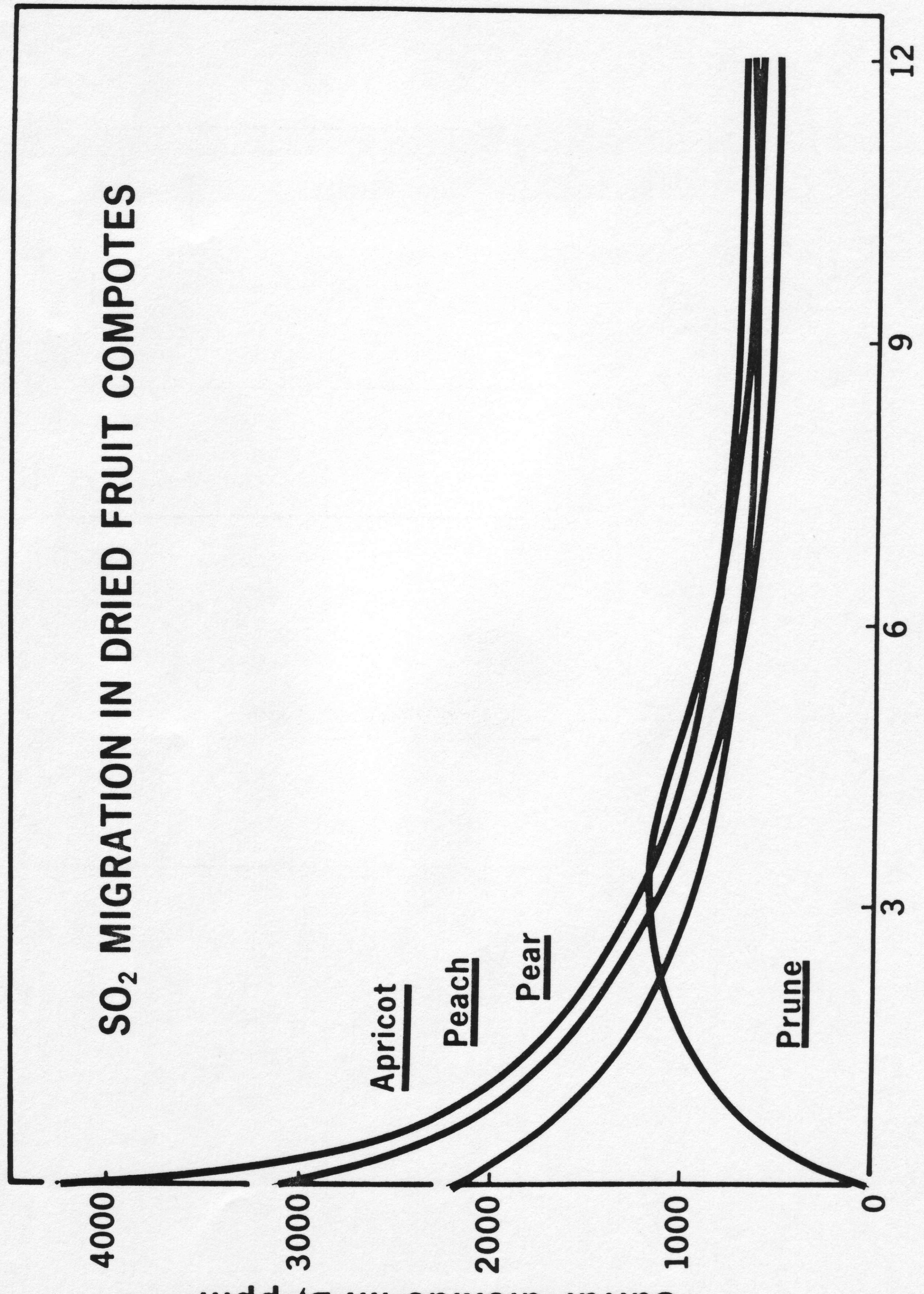

Fig. 10. SO_2 Migration in Dried Fruit Compotes 90°F.

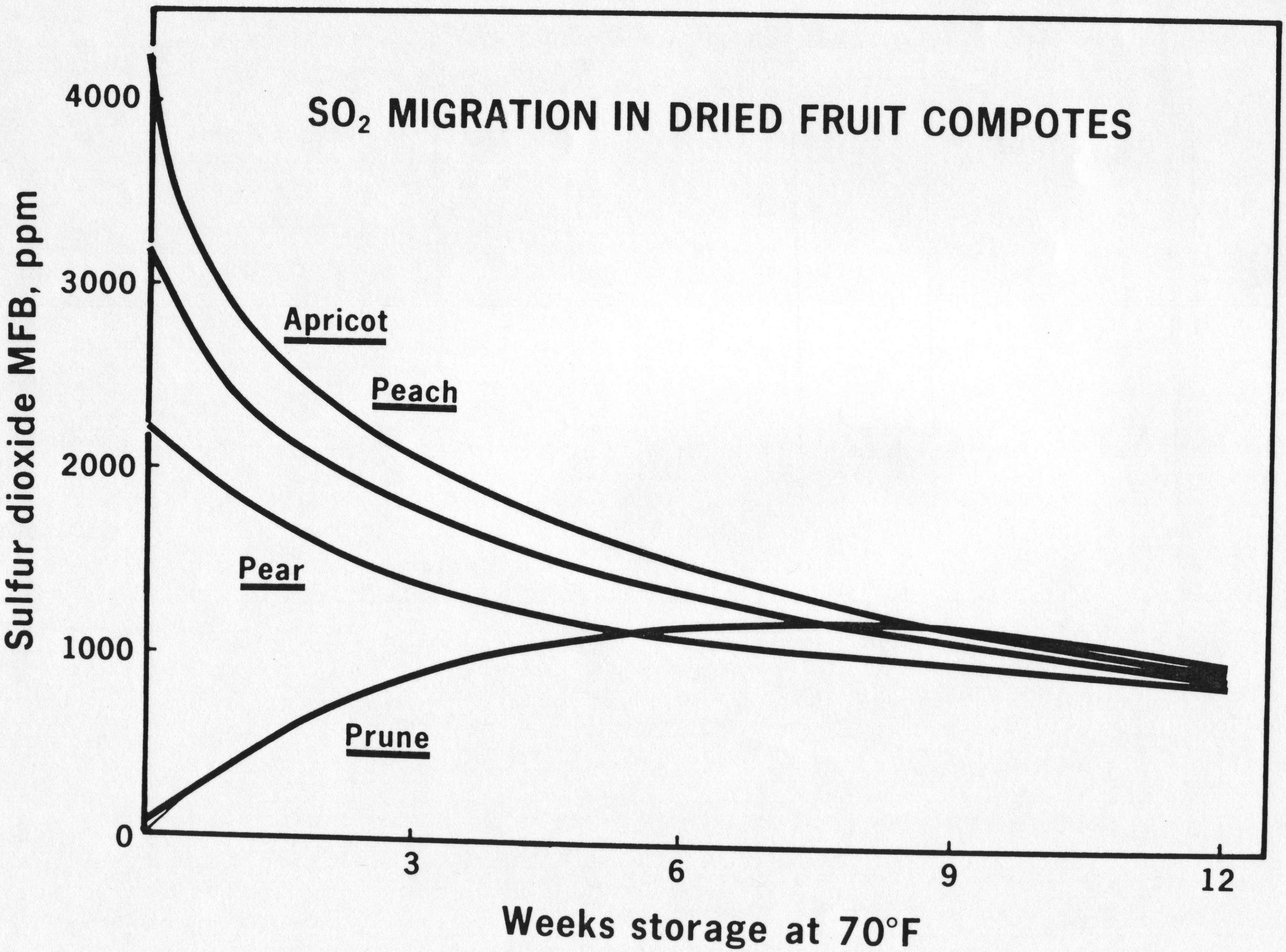

Fig. 11. SO_2 Migration in Dried Fruit Compotes 70°F.