RAISIN RECONDITIONING TRIAL

California State University, Fresno

January 13, 1977

Project Director - V. E. Petrucci
Research Technician - David Foster

STUDIES INTO THE EFFECTIVENESS OF OAKITE 78 AND FISAN-500 IN THE RAISIN RECONDITIONING PROCESS

Introduction

The worst raisin drying conditions since 1958 have once again resulted in renewed interest in the raisin reconditioning process. Already this year an improved mechanical means of reconditioning, namely the "auger system," has replaced previous systems at most of the larger reconditioners. This system has proved to be very effective in removing dirt, embedded sand, and in part, putrid mold. However, black nodular mold, which developed as a result of the unusually high moisture conditions this year, has until very recently been considered next to impossible to remove to any extent. Unlike putrid mold, which develops inside the raisin and must be physically removed or destroyed, the black nodular mold develops primarily on the outside of the raisin, and could it be stripped off, many sound raisins would be recovered.

Until now, it has been very difficult to determine just how effective the new reconditioning lines have been in removing black nodular mold. U.S.D.A. inspection procedures are not systematic and results show a great deal of variation. Therefore, our first objective was to improve sampling procedures and reduce the variability of the results.

Our second objective was to determine the effectiveness of certain chemicals as part of the reconditioning process. It should be noted that those doing the reconditioning not only wanted something that would be effective, but also something that was registered and approved for use by the U.S.D.A. Therefore, our keen interest in Oakite 78 and Fisan-500.*

---

*To assure that there would be no question in this regard, we had the U.S.D.A. Lab run residue studies on raisins washed with both Fisan-500 and Oakite 78 and obtained final approval for their use.

Because small laboratory experiments do not adequately simulate the actual reconditioning process, it was decided to undertake larger scale trials at the reconditioning plants themselves. Although this method sacrifices a certain degree of experimental control it does yield more useful results.

To date, three such trials have been conducted. The first trial was conducted on December 8 - 10 at Laminuzzi & Pantaleo in Fresno. Very briefly, the line there consists of two auger tanks preceded, separated, and followed by shakers and fairly high-pressure water sprays. Fisan-500 is metered by pump into the first auger tank; titration showed the concentration to be 0.22%. Water temperature was approximately 180°F. A composite sample was taken from four pallets of sweats prior to processing, and an equivalent sample from twelve cars of trays following drying. Subsamples were then taken for mold and sand tests. The second trial was conducted on December 13 - 16 at Cal Gem dehydrators, in Madera. Again, the line consists of two auger tanks and a series of shakers and high-pressure sprays. In this line, however, water is circulated between the two auger tanks. Seven bins of raisins were selected; three of these were processed using water alone so as to provide an untreated control. Fisan-500 was then added to both tanks and the four remaining bins were run. Fisan-500 concentration was approximately 0.13% in the first tank and 0.11% in the second; water temperature was 170°F and 190°F respectively. Because the two tanks are interconnected, exposure time was doubled to 14 - 16 seconds. Because of the high initial mold counts the raisins were run through the line twice. This has been the standard procedure for very moldy raisins. Composite samples were taken before reconditioning, and following the first and second runs. Subsamples were then taken for mold and mechanical damage tests.

The third trial, undertaken to evaluate Oakite 78, was conducted on December 29 through January 4, again at Cal Gem in Madera. The same procedure

was followed except that only one wash was required. Titration showed the concentration of Oakite 78 to be 0.37 ounces per gallon. Water temperatures were 180°F and 200°F in the first and second tanks, respectively. Exposure time was again 14 - 16 seconds.

Results and Discussion

The trial conducted at Laminuzzi & Pantaleo simply provided an opportunity to try the new sampling procedure and get a reliable indicator of results to be obtained when using Fisan-500 in the reconditioning process (Table I). The trials at Cal Gem Raisins went beyond this to actually isolate the effect of the chemicals themselves (Tables II & III).

While it is difficult to draw conclusions based on such a limited number of trials, the results do show that addition of Fisan-500 produced significantly better results than water alone, whereas the addition of Oakite 78 had little effect in terms of mold reduction. Following the first wash Fisan-500 had reduced mold an average of 20.7 percentage points compared to 10.1 percentage points for water alone. Following the second wash the average decrease was 22.1 and 16.1 percentage points for Fisan-500 and plain water respectively. What these figures suggest is that very moldy raisins may require only one washing if Fisan-500 is used; indeed, one washing with Fisan-500 accomplished even more than two washings with water alone. It should be noted that the minimum recommended concentration was being tested, suggesting that even better results would be obtained using higher concentrations. The goal would be to meet the 6% mold tolerance level with a single washing.

Although our original intention for trying chemicals was to remove the black nodular mold, the results indicate that significantly more putrid mold is also removed or destroyed when Fisan-500 is added to the wash water.

By comparison, Oakite 78 in the wash water decreased mold an average of 13.5 percentage points, compared to 13.4 percentage points for water alone.

These results suggest that it is the caustic activity of Fisan-500 that is responsible for mold removal or reduction.

Tests for mechanical damage indicate that the addition of either chemical had little effect (Table IV). If anything, Oakite 78 may even reduce mechanical damage. Mechanical damage seems to be more closely associated with the amount of incoming mold than with any other variable.

Note- The "putrid" mold tests were not conducted in strict accordance with the recommended U.S.D.A. guidelines. It is a subjective test open to different interpretations. Therefore, the results obtained are only a relative measure of the effectiveness of the products studied and not valid in the absolute sense.

TABLE I

Fisan-500 Trial

Laminuzzi & Pantaleo

12/8/76 - 12/10/76

Percentage Mold[1]	Before Reconditioning	After One Wash	Percentage Point Decrease
nodular	10.0	1.0	9.0
putrid	3.6	2.1	1.5
TOTAL	13.6	3.1	10.5
Embeded Sand[1]	failed	passed	

[1]average of two subsamples

TABLE II

Fisan-500 Trial

Cal Gem Dehydrators

Percentage Mold[1]	Before Reconditioning	After One Wash	Percentage Point Decrease	After Two Washes	Percentage Point Decrease
Control					
nodular	12.4	6.9	5.5	2.9	9.5
putrid	13.8	9.2	4.6	6.6	7.2
TOTAL	26.2	16.1	10.1	9.5	16.7
Fisan-500					
nodular	12.2	3.9	8.3	3.4	8.8
putrid	18.6	6.2	12.4	5.3	13.3
TOTAL	30.8	10.1	20.7	8.7	22.1

[1]average of two subsamples

TABLE III

Oakite 78 Trial

Cal Gem Dehydrators

Percentage Mold[1]	Before Reconditioning	After One Wash	Percentage Point Decrease
Control			
nodular	10.0	2.0	8.0
putrid	7.8	2.3	5.5
TOTAL	17.8	4.3	13.5
Oakite 78			
nodular	9.0	1.6	7.4
putrid	7.8	1.8	6.0
TOTAL	16.8	3.4	13.4

[1]average of three subsamples

TABLE IV

Mechanical Damage

Percentage Mechanical Damage[1]	After One Wash	After Two Washes
A. Fisan-500 Trial		
Control	22	27
Fisan-500	24	24.5
B. Oakite 78 Trial		
Control	18	
Oakite 78	13	

[1] average of two subsamples