

THE MECHANICAL DRAFT PRUNE DRIER DEVELOPED AT THE EXPERIMENT STATION

Good Quality in Prunes Requires That the Operator Have Control of the Three Essentials in Dehydration; Temperature, Circulation and Humidity—Quality Is Closely Associated With Heat

Preparing dried prunes of quality involves sanitation in handling, growing and harvesting fruit of the right type, preparing the fruit by grading, dipping and drying and by processing and packing. These are the steps outlined by Ernest H. Wiegand, head of horticultural products investigation at the Oregon Agricultural college experiment station. One of these chief factors in drying and processing is the new mechanical draft prune drier developed at the Oregon station.

Three Essentials of Dehydration
Good quality in prunes requires that the operator have control of the three essentials of dehydration—temperature, circulation and humidity. The temperature that fruit can stand is dependent to some extent on circulation, and the capacity of a tunnel per cubic foot is somewhat dependent on the volume of air per minute, which varies with circulation.

Nothing definite concerning any of these factors can be given until all factors, including circulation and humidity, are under control of the operator, which is impossible with the natural draft tunnel.

Heat First Essential
Heat is the first essential in drying, as it is first in the cost column, both as an essential investment and as a running expense.

Quality is very closely associated with heat and may be lowered in either of three ways. Too high initial temperature will cause dripping. Too high finishing temperature causes blots, burns and caramelization. Too low temperature causes fermentation and often mold.

Moisture, commonly considered an enemy of drying, lessens evaporation, but in the long run will further evaporation by permitting a steady uniform conduction and diffusion. It influences quality and cost by preventing case hardening and increasing conduction of the air.

Speed Influences Quality, Cost
Speed of air circulation influences quality and cost by modifying the rate at which evaporation takes place. It may lessen the chance of scorching and it may decrease the drying time.

The relation of circulation moisture and temperature, while not

definitely known, has been shown by experience to be very definite. Increase in temperature increases evaporation. Increasing humidity under certain conditions decreases evaporation. Increasing circulation increases evaporation.

Temperature, humidity, and circulation work in combination to remove moisture from the fruit, but their power is limited, depending on the product. The aim is to complete evaporation in the shortest time consistent with quality. Temperature has an influence on the drying time under all conditions—low, medium or high humidity. With prunes an entrance temperature of 120 degrees to 130 degrees gradually increasing to 150 degrees to 165 degrees at the close seems best.

Relative humidity of 15 to 30 per cent and an air movement of 600 to 750 feet per minute gives good economic results.

The mechanical draft tunnel as developed at the Oregon station is not exceptionally complicated. Station work was done to get simplicity of construction and economy of operation. The old Oregon tunnel as constructed at the station was modified by adding a recirculating system to obtain more constant temperature, increase relative humidity and give more uniform production, reduce production cost and increase the capacity of the drier.

Rapid Circulation of Air
Air is taken from the drier through the floor at the filling end of the tunnel and forced into the enclosed furnace chamber. It is forced by baffling between the hot pipes and up through the throat of the drying tunnel at a rate of about 1000 feet a minute. By allowing air to reach only through an opening 2x10 inches and to escape through a similar opening in the stack increases humidity, which was beneficial in keeping the fruit pliable and from case hardening.

Fuel consumption is reduced to a minimum by recirculation of the air, which loses only 10 to 20 per cent of heat in passing through the tunnels. It costs \$2.20 for electric power and \$2 for wood at \$6 a cord to dry 1 ton of prunes—dry weight. A No. 8 Multivane fan driven by a 7 1/2 horsepower motor was used to maintain a rate of 760 lineal feet a minute for the air over the fruit.

A fan of wrong construction and inadequate capacity will cause much grief and fail to do the work, says Professor Wiegand. He suggests that before installing a fan for handling the air the grower or commercial drier is invited to refer the matter to the station.

Temperature, humidity and circulation work in combination to remove moisture from the fruit, but their power is limited though their capacity is relatively unlimited, depending upon the fruit being evaporated. Evaporation is best when completed in the shortest time consistent with quality.

A Complicated Problem
"The problem of combining 3 variants has been found quite complicated," declares Professor Wiegand. The range of temperature is from 100 to 200 degrees Fahrenheit, circulation from 200 lineal feet per minute to 1200, and humidity all the way from natural to 40 per cent.

"Growing conditions in Oregon are peculiarly adapted to many varieties of prunes. There is a large acreage of Italian prunes in

the Pacific northwest. Orchard investment for volume and large sums of money are involved in orchard production. All this cost is economy in expenditure for drier and for drying the prunes.

"The superior method of drying by mechanical draft has been the only method possible in Oregon, but has not received, until recently, the proper scientific attention necessary to economic production of a superior production.

Sanitation Is Necessary
"Sanitation is also considered as a necessary part of standardization. In the early days less attention was given to this factor than it deserved." There was, he thinks, ample reason for hesitancy to use commercial dried foods prepared according to modern methods. These reasons no longer exist.

Sanitation starts in the field where all boxes are cleaned and the packers warned against putting rotten or moldy fruit in with the good. It is often required that all fruits and vegetables be covered in transit to the drier to prevent soiling with road dust. Even with these precautions the prune is washed before it is placed in the drier. If its solution is not used, boiling water should be, and in either case the product should be rinsed in cold water.

FROM 74 TO 355 MILLION; WALNUTS

This Was Consumption Growth in 20 Years; 60 Per Cent Even Yet

(Following is a current bulletin of the department of industrial journalism of the Oregon Agricultural college, giving in a very few words some facts and figures that are of intense interest and value to the walnut growers of the Salem district:)

The Salem Nut Growers' association has been organized as a branch of the Oregon Walnut exchange, cooperative, and will handle this year's 100 tons of nuts grown in Marion, Linn and Polk counties. The association connects up with the Dundee district on the north and the Eugene district on the south.

"This is an opportune time for walnut growers to perfect an efficient marketing organization," says C. J. Hurd, marketing specialist of the state college extension service, "when it is not especially difficult to market the nuts. Oregon producers have an excellent opportunity to establish the Oregon walnut with the trade and build up a reputation for a superior product, standardized and graded. We will then have an outlet for an increasing amount of the Oregon product as domestic production more nearly balances consumption."

Action in organizing to promote the nut industry is in harmony with the recommendation of the state economic conference. The recommended variety is Franquette grafted to the root stock of northern California black walnuts.

It was shown at the conference that use of nuts in the United States increased from 74,000,000 pounds in 1900 to 355,000,000 in 1920. Even at that home production was only about one-fourth of home consumption. At that time only about 60 per cent of the plantings were in bearing.

FARM REMINDERS FROM THE COLLEGE

(Following are excerpts from a current bulletin of the department of industrial journalism of the Oregon Agricultural college:)

Curing Good Hay Factor
Successful hay curing in Oregon depends on getting the surplus moisture dried out rapidly with the least loss of leaves and fine parts. Cutting hay while it has plenty of green leaf surface and nutrition in the plant is recommended by the experiment station. Over ripe hay with the seed fully formed and ripened has a large loss of leaves, which materially lessens its feeding value. The palatability is decreased and the market price lowered. The experiment station is cooperating with the United States department of agriculture in the development of new hay grades.

Dry Time Hurts Thistles
Canada thistles and other perennial weed pests are more easily controlled during the dry weather now present in Oregon. Cutting off the plants and burning those which are about to bloom will greatly weaken them, finds the experiment station. Plowing and spring tooting the ground will kill many of the roots. Continued clean cultivation during the summer and sowing a heavy smother crop of grain and vetch early in the fall will do much toward eliminating the perennial weeds.

Land plastered clover is standing the dry season better than much of the clover that has had no treatment.

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