

Disposal of Winery Wastes

effective treatment of stillage by combination of neutralization, anaerobic digestion, and oxidation

Reese H. Vaughn and George L. Marsh

Abatement of the offensive odors rising from disposal ponds of liquid winery wastes is a major problem of many California vintners.

No available constituent of winery distillery wastes is currently in sufficient economic demand to warrant by-product recovery, so some form of land disposal has been used when possible.

Application of the wastes to land prepared as ponds is satisfactory when the soil characteristics permit rapid filtration and percolation of the wastes. When an impervious layer of subsoil—known as hardpan—is close to the surface, land disposal is not satisfactory. The surface layers of soil become plugged, and filtration and percolation cease. Losses by evaporation alone are not sufficient to prevent the accumulation of large quantities of impounded wastes. When the accumulated wastes decompose, they give off extremely offensive odors. Also, the lateral spreading of the liquids in the shallow layer of pervious soil above the hardpan is continuous, and plant life around the disposal area is often fatally damaged.

Perhaps the best way to use land for disposal of winery distillery wastes is a system of intermittent irrigation. In this method, the polluted liquid wastes from each 24-hour operation are discharged into an irrigation check at the rate of 100,000 gallons per acre at a depth not to exceed 4". The check is then allowed to stand for at least six days before receiving another application. At least seven irrigation checks, each large



Dried, cracked, and rolled solids filtered out of stillage at ground level. Solids should be in this condition before more stillage is added to the check.

enough to handle one day's stillage, are required for proper operation of this system. If the soil characteristics are not ideal, more than seven checks are needed.

The one application of wastes—followed by six days' rest—permits the rapid filtration and percolation of the liquids into the soil. The rest period also permits the drying, cracking, and curling of the solids filtered out at ground level, thus preparing the soil surface for another application of waste. If the stillage is from pomace stills, the checks require

about twice as long a rest period, unless the disintegrated pomace solids are removed before application.

Various chemicals alleged to assist in odor control in disposal ponds have not been particularly effective. The use of chemicals—in at least one case—disrupted normal biological processes to such an extent that the odor nuisance was greatly intensified by the putrefaction of countless numbers of dead rat-tailed larvae.

The amount of land required is the most important problem of the intermittent irrigation system. The largest wineries may discharge 500,000 or more gallons of waste per day even when the unpolluted waters are segregated. This volume would require 35 or more acres of land for adequate disposal.

In some areas, the lack of available land has added to the problem and in other areas, it is the increased land values resulting from real estate developments in close proximity to the wineries. Consequently, interest has increased in partial and complete treatment of winery distillery wastes.

Prior Treatment

The organic load of winery distillery wastes can be reduced about 50% by detartration or by lime flocculation to a high alkali content. Each of these chemical treatments has been used to conserve land area for the intermittent irrigation system of disposal.

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Irrigation checks for intermittent irrigation system for disposal of stillage.



Vibrating screen solids separators for removal of pomace from stillage.



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POPULATION

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classified as part-time, institutional, or residential units, which leaves the number of commercial farms at 99,168. As the preceding table indicated, approximately one fifth of the operators of these commercial farm units have off-farm sources of income that exceed the gross income of the farm. Hence, it follows that farming is the principal activity on no more than 80,000 farms—approximately 60% of the state total—and that agriculture—on at least 57,000 farm units—is secondary to other activities and sources of income.

Moreover—as shown in the following table—farm operators' off-farm employment is on an uptrend which is not significantly affected by the currently prevailing level of economic activity.

Farm Operators Working Off Their Farms, by Census Years

Days of off-farm work	1929 1934 1939 1944 1949				
	%	%	%	%	%
1-49	7.3	5.0	5.0	2.2	6.8
50-99	4.8	5.0	4.0	2.1	4.4
100 and over	19.2	20.8	23.4	26.0	32.0
Total	31.3	30.8	32.4	30.3	43.2

The evidence examined here shows that farm people are not exclusively occupied in agriculture but that, on the contrary, there is considerable diversity of occupations and economic activities within the gainfully employed population living on farms. Thus, farm people quite extensively participate in the general economy of the state.

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A second article in this series on the farm population of California will appear in the December issue of California Agriculture.



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DISPOSAL

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Experiments indicate that vibrating screens are effective for the removal of pomace solids from stillage before treatment of the wastes. However, no completely satisfactory device has been found for separation of the light and bulky sludge that results from chemical flocculation. Efficient removal of suspended solids from winery distillery wastes remains an important problem.

Biological treatment of the wastes after chemical and physical separation of the solids has been studied by several research workers. From the results of the investigations, it can only be concluded that complete disposal of concentrated

winery distillery wastes by oxidation—in the conventional biological filter—is difficult and must be accompanied by pretreatment.

The extreme fluctuation in the organic matter subject to decay—producing the offensive odors—contained in the raw stillage, combined with their seasonal, intermittent production, must be considered if a combined system for complete disposal is to be an economic solution to the problem of winery distillery waste.

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