

A REVIEW:

Wastewater treatment at winery industry

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Wastewater generated by processing and cleaning operations is the most significant environmental management issue at wineries. An understanding of sources and fate of winery wastewater and the impacts of variations in quality and quantity is an important step towards environmentally sustainable management of winery wastewater. Winery wastewater comprises a rich cocktail of tannins, complex carbohydrates and proteins in an aqueous mixture. Winery wastewater varies significantly over the growing and processing seasons in terms of volume and concentrations of contaminants. Chemical oxygen demand (COD) and biological oxygen demand (BOD) also vary over the growing and processing cycle with the highest concentrations found in the vinification season. Total dissolved solids (TDS), Total suspended solids (TSS) and total solids (TS) are also the other major pollutants in winery wastewater. Ponding and lagooning are low cost treatment methods for winery wastewater. Another option of treatment is use of returned activated sludge system which is more efficient than a pond ecosystem. The BOD reduction in pond or activated sludge process both, require an irrigation pond for final disposal of treated wastewater. Due to fastest growing winery industry, it is essential to treat the winery wastewater by adopting some possible treatment which is cost effective.

Wine is the product obtained from the total or partial alcoholic fermentation of fresh grapes whether, or not crushed, or of a grape must. Producing wine requires implementation of biotechnological sequence involving several unit operations. Although some few products are added to the must and wine, several residues are rejected, either as liquid or solid wastes. White wine is produced by the fermentation of clarified must, which is obtained after grape stem removal, pressing of the resultant grape berries and subsequent clarification. The production of red wine is conducted in non clarified musts, prepared after grape stem

removal and crushing of grape cluster. Musts can also be fermented in the presence of grape stems. After fermentation, wine must be clarified and stabilized chemically and microbiologically, before bottling to produce wine (Latin: *vino verde*). This wine follows the ordinary wine making process, but ageing is avoided, in order to preserve the original freshness and fruity characteristics. Worldwide wine production is $261 \times 10^5 \text{ m}^3$ of which 69% from Europe, 18% from America, 5% from Asia, 4% from Africa and 4% from Oceania. The worldwide wine consumption is $228 \times 10^5 \text{ m}^3$, distributed by Europe 68%, America 20%, Asia 7%, Africa 3% and Oceania 2%. Today water pollution is the largest environmental problem in the country like China and India, where the scarcity of water occurs throughout the year because of continuously increasing population. Today winery industry is the fastest growing industry in Maharashtra state of India because of grape farming activities in Maharashtra. Due to which much more wine is produced in vintage and non-vintage seasons depending on the quantity of production in litres. For that purpose large quantity of water is required for the winery process. The winery wastewater is generated through various operations such as water generated during tank cleaning, barrel washing, equipment washing, bottle washing, floor and crush pad washing, cooling water and water softener waste brine. Wineries and other grape processing industries annually generate large volume of wastewater. This mainly originates from various washing operations during crushing and pressing of the grapes, as well as rinsing of the fermentation tank, barrels and other equipments or surfaces over the year volume and pollution load greatly vary in relation to the working period (vintage, racking, bottling) and to the wine making technology used, e.g., in the production of red, white and special wines. Yeast is used in the fermentation of grape juice and they have high content of polyphenol, so yeast cannot be used

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