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## Towards better and cheaper winery wastewater treatment



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## Why treat winery wastewater?

- Regulatory requirements
  - Varies across states & territories
  - Not necessarily clear cut
- Reduce environmental problems, increase environmental benefits, improve water security
  - Treatment suitable for storage & reuse
- Ethical & social considerations
  - Reputation with government, community/neighbours & consumers

Waste management is indivisibly linked to efficient winery operations & therefore profitability

## Is it waste?

- Why not consider it a valuable resource?
  - Re-use
  - On-sell
  - Opportunity to improve process efficiency
- Other benefits difficult to price
  - Reputation
  - Environmental credentials

## Consider the whole business

1. Winery processes dictate wastewater characteristics....
2. Therefore influence the treatment options....
3. In turn, the end-use options



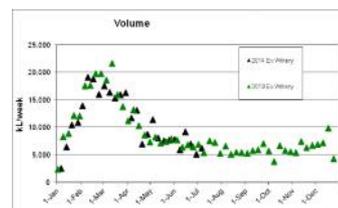
Adapted from www.agwa.net.au

## Characteristics of the waste stream

Category	Measurement	Category	Measurement
Physical	Temperature <b>Ambient</b>	Cations	Sodium <b>High</b>
	Suspended solids <b>Moderate</b>		Potassium <b>Very high</b>
	Dissolved solids <b>Moderate</b>		Magnesium <b>Low</b>
Organics	pH <b>Low</b>	Anions	Calcium <b>Low</b>
	BOD <b>High</b>		Chloride <b>High</b>
	COD <b>High</b>		Sulfate <b>Moderate</b>
	TOC <b>High</b>		Bi/Carbonate <b>High</b>
Nutrients	Nitrogen <b>Variable, Low</b>	Microbiology	<i>E. coli</i> <b>Low</b>
	Phosphorus <b>Low</b>		Coliforms

## Water volumes & flow

	Typical Practice	Best Practice
Water use	1.4L/750ml bottle	0.5L/750ml bottle
Process water (without bottling)	1.4kL/tonne of crush	0.5kL/tonne of crush
Process water (with bottling)	2.3kL/tonne of crush	



## Remove items that we don't want to treat as:

### Cost of removal < Cost of treatment

- Wine & juice (product lost)
- Grape skins/seeds
- Lees
- Caustic from tank cleaning

Cleaner Production

## Cleaner Production

- All starts & succeeds with
  - training
  - understanding workplace best practices
  - engagement with all employees
- Need vertical integration across the business culture
  - communication between production & treatment

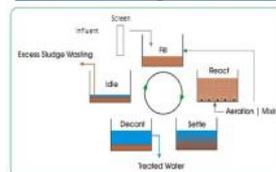
## End-use considerations

- Understand the source....
- Apply the right treatment....
- Minimise the cost

Treat for end-use

1. Source → 2. Treat → 3. Reuse or Dispose

## Winery wastewater treatment



Sequencing Batch Reactor (SBR)

## Biological treatment

- After physical removal of solids
  - Aerobic treatment
  - Anaerobic treatment
  - Other....
- 1. Capital intensive
- 2. Labour & energy intensive
- Accounts for a significant cost to business

So do it right....but what can go wrong?

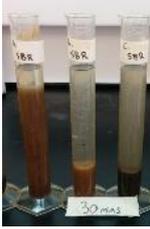
## Problems associated with biological treatment

What happens when the microbes are not happy?



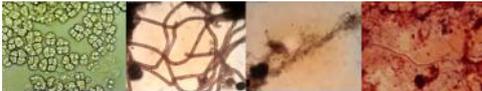
Source: [www.innerhealth.com.au](http://www.innerhealth.com.au)

## Bulking & cloudy water



- Decreased settleability biosolids
- Poor sludge dewaterability
- Reduced effluent quality
- Maintenance difficulties
- Hydraulic overloading

Costs ↑↑ energy & labour



## Foaming

- Thick, floating stable biomass
- Can overflow & putrefy
- Reduces oxygen transfer at the surface
- Reduces effluent quality

Costs ↑↑ energy & labour

Unsightly, neighbour concerns



## Off-Odours

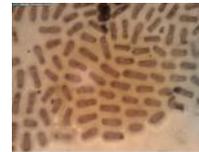
- Common odours
  - ammonia
  - hydrogen sulfide
  - esters, mercaptans and aldehydes
- Overloading systems

Costs ↑↑ energy & labour

Neighbour & regulatory concerns



## Why?? Unknowns??



## With a better understanding of microbiology

- Encourage the growth of beneficial bacteria
  - Improve organic removal
  - Better manage energy input
- Discourage the growth of unfavourable bacteria
  - Minimise problems occurring

Will make treatment more efficient and cost effective

## Resources



[www.agwa.net.au](http://www.agwa.net.au)

Effective waste management =  
Sustainable profitability



Source: [www.zerowastesa.gov.sa.au](http://www.zerowastesa.gov.sa.au)

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