Climate change:

ADAPT TO SURVIVE

IN THE FACE OF RAPID CLIMATE CHANGE, WHAT CAN THE SOUTH AFRICAN WINE INDUSTRY DO TO SURVIVE?

BY **JANA LOOTS**

SOUTH AFRICA has developed a world-renowned and thriving wine industry over the past 363 years. At its core is a diverse range of soils and microclimates which create the perfect conditions for growing the grapes that make the country's exceptional wines. But shifting weather patterns are creating an uncertain future for the industry and only those who adapt will survive.

THE SIGNS

"It's indisputable that human activities are causing climate change, making extreme climate events, including heat waves, heavy rainfall and droughts more frequent and severe," says the United Nations Intergovernmental Panel on Climate Change's Sixth Assessment Report (IPCC ARC6) which was published in 2021.

According to the report, the average temperature from 2021-2040 is expected to increase by 2 °C compared with the average from 1960-2020, and rainfall in the western parts of South Africa will decline by 15-20% in the same period. "Not only is it becoming hotter and drier, but the frequency of hotter and drier days is increasing," says Prof Stephanie Midgley, scientist: climate change and risk assessment at the Western Cape department of agriculture.

Other signs of climate change include erratic rainfall patterns with an overall increase in aridity, agricultural and ecological droughts, increasing wind speed in certain regions and a higher risk of hail and thunderstorms in summer rainfall areas. According to a recent SmartAgri report by the Climate Systems Analysis Group, rainfall in the Western Cape is expected to decline in most areas and even where it's not projected, increasing temperatures will result in significant water balance challenges due to greater plant transpiration and evapotranspiration.

WHAT DOES IT MEAN FOR GRAPES AND WINE?

In a 2020 survey by Dr Etienne Neethling, head of the MSc Vintage at the Ecole Supérieure d'Agricultures in Angers, France, most South African wine grape producers have indicated that climate change affects grapevine phenology, yields, sugar accumulation during berry ripening and an increase in the occurrence of pests and diseases.

"Weather conditions affect the grapevine phenology and external influences such as pests, diseases, sunburn and frost damage, which in turn influence grapevine yield and the wine's colour, flavour, pH, sugar and acidity," Vinpro consultation manager Conrad Schutte says. "To ensure healthy vines, good yields and a consistent wine style, you need to continuously adapt to climatic variations."

THE AVERAGE TEMPERATURE WILL LIKELY RISE BY 2°C AND RAINFALL IS EXPECTED TO DECLINE BY 15-20% BY 2040.

Cooler seasons are more conducive to elegant, lighter wine styles, but wineries that strive for fuller, more robust wines need to break open canopies, limit lateral shoot growth and harvest later to allow for greater flavour concentration. During a warmer season, producers who focus on elegant wine styles should keep larger canopies and lateral shoots and irrigate more to protect grapes from the heat.

"We shouldn't underestimate the alternating cooling and warming effect of the sea breeze on the coastal regions, which helps buffer climatic extremes and creates unique mesoclimatic pockets that awaken fantastic flavour profiles in our wines," says Dr Tara Southey, postdoctoral researcher at the Centre for Geographical Analysis.

HOW ARE WE ADAPTING?

"Although the wine industry has been researching and adapting to climate change for many years, the drought from 2016-2019 was a wake-up call for many wine grape producers and winemakers," Stephanie says.

"We want to help wine grape farmers produce high-quality grapes and wine in a sustainable, profitable way in the context of climate change," says Gerard Martin, executive manager of Winetech, which funds and coordinates various research projects focusing on irrigation strategies, vine reaction to water stress, drought-resistant cultivars and rootstocks, and the management of wastewater.

The industry has compiled guidelines for managing vineyards during drought conditions and these have become a benchmark for viticulture going forward. "Always manage vineyards according to your wine goal, while adapting to specific terroir and climate variations," Conrad says.

"First, you need to understand the terrain, climate and soil profiles on your farm through tools such as the TerraClim online resource, which will guide initial site selection and help you manage existing vineyards more effectively," Tara says.

Deep soil preparation before planting ensures an extensive root system that will absorb water effectively. Producers can also apply mulches and plant cover crops between rows and underneath vines to aid water absorption, reduce evapotranspiration, suppress weeds that compete with vines for water and ensure healthier soils while reducing carbon emissions into the atmosphere.

Setting up a water budget and designing the irrigation system accordingly will help producers manage their water resources efficiently. "Closely monitor plant and soil water status through pressure chambers and neutron probes to determine the intervals between longer and deeper irrigations," Conrad says. "Irrigation systems should also be well maintained, with no leaks or blockages."

Fertiliser applications should be guided by soil samples to prevent vigorous growth, which would require more water. Top, tip and suckering up to a 1.2 m shoot length are also important actions to control vigorous growth, along with crop control measures depending on the available water.

A range of drought-, heat- and disease-resistant rootstocks, clones and cultivars are increasingly available to the industry, including Richter 99 and 110 rootstocks, red varietals such as Arinarnoa, Durif, Grenache Noir, Malbec, Marselan and Tempranillo, and white varietals such as Assyrtiko, Macabeau, Marsanne, Piquepoul Blanc, Verdelho and Vermentino.

"While these new cultivars have shown promise in commercial, research and demo sites, producers should consider their target market to ensure a return on investment," Etienne says. "The industry should create a greater awareness of these varietals among consumers or regions could collectively focus more on promotion of place versus cultivar."

THE WAY FORWARD

"Water is going to be scarcer going forward and the wine industry is set to compete with a growing population and other sectors for water resources," Conrad says. "There are numerous research projects, demonstration sites, resources, online tools and a network of expertise on climate change adaptation in the vineyard and cellar. Be informed and adapt if you want your business and the South African wine industry to survive."

REGIONAL DIFFERENCES

South Africa has a diverse range of wine grape growing regions and mesoclimates that experience and adapt to climate change in varying ways.

OLIFANTS RIVER

Rainfall is noticeably lower in the Olifants River region and occurs later in winter, along with warmer weather, which has resulted in declining water availability from the Clanwilliam Dam. "It also seems as though we're skipping spring, with a cool December being followed by an abnormally hot January," says Tehan Engelbrecht, wine and table grape producer on Kapel farm near Klawer. "Harvest time dragged on for a month later than normal. Because the leaves were active for longer to ripen the grapes, they were tired by the end of the season and showing signs of downy mildew and sunburn." Vineyards that were affected by the drought seemed to be more susceptible to virus infections, leading to lower yields and sugar levels.

To mitigate climate change, Tehan has built storage dams and monitors soil moisture through probes. He also irrigates vineyards from spring onwards at 70% withdrawal for 12-24 hours at a time to ensure sufficient depth to prepare for drier periods. "If the winter wasn't cold enough, we spray dormancy-breaking products to ensure sufficient and even budding," he says. "Because we have a later, shorter autumn, we start applying postharvest fertiliser as soon as possible after harvesting."

NORTHERN CAPE

The Northern Cape is a summer rainfall region and has its own set of challenges. "An intense drought was followed by the current higher rainfall cycle, along with hailstorms and late frost in larger areas along the Orange River," says Natasja Eden, technical officer for viticulture at Orange River Cellars.

Large weirs built in the Gariep, Vanderkloof and Bloemhof Dams to mitigate increasing flood risks are obstructing the flow of cold air, which increases the risk of frost damage during budding. All these conditions complicate the management of pests, diseases and excessive vine stress, which in turn affect the vine's ability to ripen grapes and build up reserves for the next season.

"We continue to produce good-quality, fruit-driven wines, with inputs in the cellar, but have seen much lower yields over the past two years," Ferdi Laubscher, senior winemaker at Orange River Cellars says. "Due to profitability pressures and growing challenges, many producers are replacing their vines with more lucrative crops such lucern, pecan nuts and citrus,"

Producers with the means are increasingly implementing preventive spraying programmes to manage pests and diseases, thinning out canopies and even using helicopters to aerate vineyards. To limit frost damage in lower-lying areas they prune as late as possible to delay budding. They also use large fans to ensure air movement and irrigate vines just before frost is expected. ◆