

Automated high throughput plant phenotyping to assess sunflower planting dates

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Abstract

South Africa is dependent on dryland farming, causing crops to be sown only once the rainy season begins. With climate change altering weather patterns, unpredictable rainy seasons may lead to cash crops such as maize and soybean being planted later, which makes them susceptible to extreme temperatures and drought. Farmers often switch to planting sunflower (*Helianthus annuus* L.) under these conditions because of its shorter rotation time and hardier nature. For this reason, sunflower tends to be planted outside of its optimal planting window. To understand the effects of different planting dates on sunflower growth and development, a planting date trial was established in Potchefstroom under the Phenospex FieldScan system. Low-and high-density monthly plantings were sown from October to March and scanned three times a day (RGB, NIR, Laser). Values are extracted to calculate plant growth and health indices over the season for each planting date. The aim of this project is to develop a Shiny application that can analyse the Phenospex data outside of the platform. Phenospex software is expensive and impractical to use in the South African context with unstable infrastructure because it requires the server to be on in one location for analysis in a different location. The Shiny app will allow Phenospex data to be analysed offline, offering more flexibility in an African setting.



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BodyText: South Africa is dependent on dryland farming, causing crops to be sown only once the rainy season begins. With climate change altering weather patterns, unpredictable rainy seasons may lead to cash crops such as maize and soybean being planted later, which makes them susceptible to extreme temperatures and drought. Farmers often switch to planting sunflower (*Helianthus annuus* L.) under these conditions because of its shorter rotation time and hardier nature. For this reason, sunflower tends to be planted outside of its optimal planting window. To understand the effects of different planting dates on sunflower growth and development, a planting date trial was established in Potchefstroom under the Phenospex FieldScan system. Low- and high-density monthly plantings were sown from October to March and scanned three times a day (RGB, NIR, Laser). Values are extracted to calculate plant growth and health indices over the season for each planting date. The aim of this project is to develop a Shiny application that can analyse the Phenospex data outside of the platform. Phenospex software is expensive and impractical to use in the South African context with unstable infrastructure because it requires the server to be on in one location for analysis in a different location. The Shiny app will allow Phenospex data to be analysed offline, offering more flexibility in an African setting.