

Vineyard Management System Using GIS Modelling MARCH, 2007

ABSTRACT:

As the viticulture industry grows in size and importance in Ontario, new technologies and applications are needed to support precision agriculture processes and solve typical industry problems. One such problem is that of winter damage to vines in the Niagara Region, an area that can experience temperatures lower than eighteen below zero, the temperature at which *vitis vinifera* grape vines are killed. Through the development of data-driven 3D models of a regional vineyard, the college was able to validate the placement of SIS wind machines to alleviate frost damage in the vineyard.

KEYWORDS:

GIS, viticulture, vineyard management, topography, SIS (Selective Inverted Sink), wind machine

INTRODUCTION

The College's own Teaching Winery served as a first "test bed" to develop 3D GIS-accurate images to identify cold air pooling. The College then responded to a request from a regional grape grower, Mr. Len Crispino, to determine the most effective placement of wind machines (three Selective Inverted Sink Machines) to lessen cold weather damage to vines.

DESCRIPTION OF RESEARCH

The college used a new high-tech GPS device, the IKE 304, to obtain points that represent the positioning of each vine in the vineyard. Each vine was linked to a database in which coordinates, production yields, soil analysis, a digital photograph, and overall health were stored. From here, these points were used to generate complex GIS maps in which slope, aspect, contours, wind patterns, and cold air pooling were taken into account in providing a tool for analyzing the vineyard topography.

Dr. Mike Duncan and his team of researchers are focusing on the use of advanced visualization technologies, 3D imaging, and GIS technologies to develop precision agriculture solutions. GIS points were used to generate a realistic 3D map of the vineyard, providing the ability to move effortlessly (fly through) throughout the vineyard and surrounding areas.

FINDINGS

In this particular project, it was found that the damage to the vines was in part a result of cold air pooling, but in fact was also a result of soil type and irrigation.

Using data-driven, GIS-based, 3D mapping technologies developed by the Augmented Reality Research Centre, the researchers, College vineyard manager, and local grape grower have joined forces to take precision agricultural techniques to a higher level.

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mduncan@niagarac.on.ca showing 47,000 vines in a
local vineyard

THIS PROJECT WAS PARTIALLY FUNDED
THROUGH THE AGRICULTURAL ADAPTATION
COUNCIL OF CANADA

