

**Lab 1 - CropCircles Product Description**

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## **Table of Contents**

### **1. Introduction**

### **2. CropCircles Product Description**

2.1 Key Product Features and Capabilities

2.2 Major Components (Hardware/Software)

### **3. Identification of Case Study**

### **5. Glossary**

### **6. References**

### **List of Figures**

- Figure 1: *Major Functional Component Diagram*

**5**

## 1. Introduction

The ability of using a garden to its full potential and transforming the crops it yields into a diverse array of post-harvest products relies on individual motivation and addressing knowledge gaps through utilizing community resources properly. Gardening has seen a significant rise, according to a survey conducted by the National Gardening Association, the covid pandemic helped to create more than 18.3 million new gardeners in 2021 (Mayers, 2023). This increase brought the percentage of American households participating in gardening activities to 55% (Mayers, 2023). This influx of new gardeners also increases the number of gardeners who lack guidance on recipe ideas, impacting the ability to efficiently use their produce post-harvest.

This information gap is exacerbated by the disconnect in the use of mobile apps as a source of information for gardening. Only 20% of gardeners use a mobile app as a source of information (Mayers, 2023). This comes as 37% of gardeners spend more than 10 hours a week online and 57% of gardeners have engaged in social networking in the past year (New study reveals home gardening statistics, 2012).

Gardeners are also more likely to place on emphasis on buying food that is locally sourced. Gardeners are 26% more likely to buy locally grown food (New study reveals home gardening statistics, 2012). The most local a food can get is being grown and then produced at your own house. Two out of three gardeners tried a new gardening activity during covid (Mayers, 2023). With the importance of local food and the willingness to learn new gardening activities, novice gardeners need the information tools to be able to achieve the post-harvest transformation of their harvest.

The knowledge gap is not limited to gardeners who know what they are trying to do with their crops post-harvest. Gaps exist between consumption of many products and hobbyists making those products. 79 million Americans consume wine while only 500 thousand North Americans make wine as a hobby (Asimov, 2023). One of the factors for why this gap exists is the lack of knowledge of how to exactly make wine, including what wine can be made from. Wine can be made from any fruit, including strawberries, which are the most popular small fruit in the home garden (Black, et al., 2023).

To provide users with a central hub for product making and community driven growing solutions through the implementation of CropCircles, product forums that provide users with like minded individuals with similar growing goals where they can foster a sense of community.

CropCircles will solve the knowledge gap by allowing for community driven growing solutions and product making through the implementation of a CropCircle. A CropCircle is a group of like-minded individuals, set out with similar goals for transforming the crops they grow into a product. These communities allow for collaborative solutions, but also allow for experts on topics to weigh in and provide guidance where needed.

Users will be able to explore product types and discover new ways they can transform the crops they are already growing into a product. Users will also be able to find desired products and discover what steps and crops they need to grow to fulfil making this product. Through question forums and blog posts users will be able to learn step by step the process of how to grow a crop and turn it into a product.

## **2. CropCircles Product Description**

The primary functionality of CropCircles is connecting like-minded individuals into groups where they can disseminate information through a community of gardens of all skill levels with the purpose of post-harvest production in mind. CropCircles also allows for historical record keeping to keep track of what went right and wrong in this journey. As well as the ability to journal about everyday activities to reference when issues arise in the garden or production process.

### **2.1 Key Product Features and Capabilities**

CropCircles is aiming to attract users that range from novice to expert when it comes to gardening. Gardeners will access the app and can manually input the crops they are growing. This then gives them access to a daily journaling feature that will scrape weather data to update each journal entry with accurate weather and temperature for that day. The weather data will use zip code of the gardener to find this information.

Beyond collecting the plants they are growing, CropCircles will provide users with a Q/A forum. This will allow gardeners of all levels to ask questions about things they encounter. Gardeners who have knowledge on the questions can then reply. All users will then be able to give feedback on the answer, rating it helpful or unhelpful, allowing a crowdsourcing of information.

CropCircles' premier feature is allowing gardeners to join a CropCircle. A curated group that includes an expert and other novice gardeners who are making a like product. A CropCircle provides a recipe and steps for members to follow. Along with steps a CropCircle provides specialized forums catered to the product you are making.

CropCircles will also provide all users with a growing recommendations forum. This forum allows users to share posts and chat about what grows best in their area and suggestions they have for growing. Users can then provide feedback and interact with these posts to gain and share their knowledge with other CropCircle members

CropCircles have a growing updates forum where users can post progress updates to help encourage users in CropCircle discussions. This enables encouragement and suggestions that users can have in their groups.

CropCircles allows for user to view historical product completions. This allows the user to view these for future reference. Notes can be added by the user, this enables them to view past products and know important information that was learned at a quick glance.

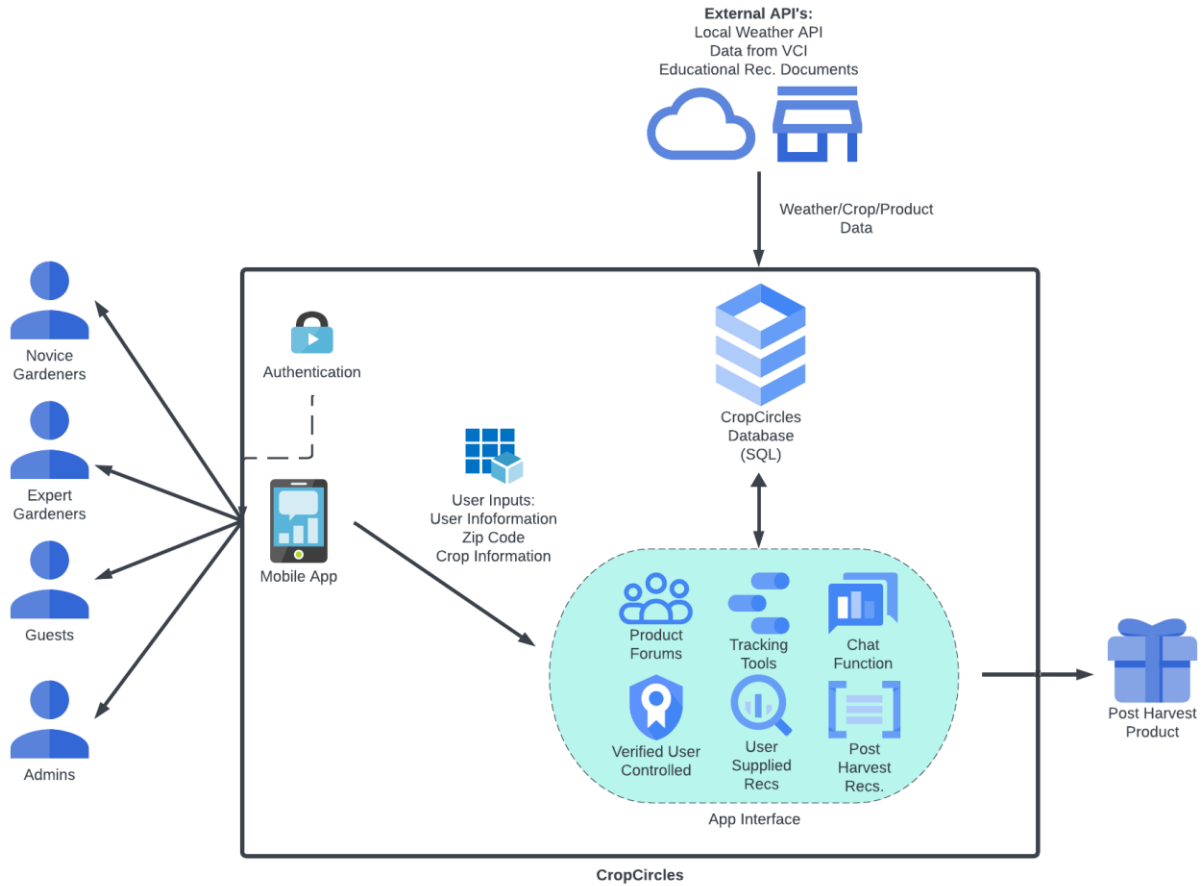
Users are provided with a post-harvest forum for browsing recipe suggestion and providing recommendations on the products. Users will be able to suggest information from their storage techniques, handling techniques, and any other recipe specific information they wish to suggest.

## **2.2 Major Components (Hardware/Software)**

CropCircles consists of an application on the gardeners phone. This application requires access to the internet to be able to connect to other gardeners in a CropCircle and the forums. It also requires the users location with a connection to the internet to be able to pull weather data from the users zip code. Figure 1 illustrates the functional components of CropCircles.

**Figure 1**

*CropCircles Major Functional Component Diagram*



The data flow in CropCircles is as follows: gardeners enter their user information and crop information into CropCircles which is then stored in the database. This information, along with the users selection is then used to find the user a CropCircle for the specific product they are attempting to make. The users membership to a CropCircle is stored in the database. Users have the ability to make forum posts and chat with other users, these communications are also stored into CropCircles database. User Journaling and Historical Data is stored into the database.

CropCircles is an Android based app. All data is stored in the cloud utilizing Amazon Web Services with the client application connecting remotely. Users are required to have internet

to access CropCircles. CropCircles uses Amazon Relational Database Service in conjunction with MySQL for data management. OpenWeather is used to gather weather data which is stored in the database under journal entries.

### **3. Identification of Case Study**

The prototype case study consists of a minimal number of users, around 10, with the diverse backgrounds. These backgrounds consist of users with the following: no gardening experience, stand or average gardening experience, proficient gardening experience, and certifiable experts. These backgrounds will be accurately identified for the case study.

The prototype will also include a reduction in scale. The number of crops will be reduced to just a single crop. This crop has been identified as strawberry varieties. The number of products has also been reduced to two. The two products will be jam and wine. Strawberries are chosen as the crop of choice as it is the most common small fruit grown in gardens. Jam and wine have been selected as the products as they introduce two products at different skill levels associated. Jam can be produced by most already owned household items and has a lower entry barrier. Wine may require specialized purchases, such as yeast, and a longer time to produce due to fermentation, giving it a larger entry requirement for a user to make. This difference in complexity is important to judge how CropCircles can handle products that require different requirements to make.



## 5. Glossary

- **Annuals:** Plants completing their life cycle in one growing season, providing vibrant blooms and requiring replanting each year for seasonal color and variety in gardens
- **Blanching:** A brief exposure of harvested vegetables to boiling water or steam, often followed by rapid cooling, to halt enzyme activity and preserve color, texture, and nutritional value
- **Brining:** The immersion of harvested produce, particularly fruits or vegetables, in a solution of salt and water to preserve, flavor, or enhance texture
- **Canning:** A preservation method involving the sealing of harvested food in airtight containers and heat processing to prevent spoilage, commonly used for fruits, vegetables, and sauces
- **Cider:** A beverage made from the fermentation of apple juice, resulting in a mildly alcoholic drink with various levels of sweetness and carbonation
- **Community Forum:** A social feature in the gardening app that enables users to connect with other gardener users, share experiences, ask questions, and seek advice on various gardening topics

- **Compost:** Decomposed organic matter, such as kitchen scraps and yard waste, used as a nutrient-rich soil amendment to improve soil structure and fertility
- **Curing:** The controlled drying and conditioning process applied to certain crops, such as tobacco or onions, to enhance flavor, texture, or storage qualities
- **Dehusking:** The removal of the outer husk or shell from a harvested crop, commonly applied to grains, nuts, or seeds
- **Expert Gardener:** A gardening professional with certified expertise gained through formal education, training, or hands-on experience in product-related subjects. They lead and manage groups focused on specific gardening products
- **Fallow:** Allowing a field or garden bed to remain unplanted for a season to naturally restore fertility, control pests, or prevent soil erosion
- **Fermentation:** A microbial process used in the post-harvest stage to transform certain crops, like cocoa or coffee beans, through the breakdown of compounds, often resulting in improved flavor or quality
- **Frost Date:** The average date of the last spring frost or the first fall frost in a specific location, crucial information for gardeners to determine appropriate planting times and protect sensitive plants

- **Harvest:** The point at which the crop is ready to be gathered for use
- **Heirloom Seeds:** Seeds from plants that have been passed down through generations, maintaining their original characteristics, and often valued for their historical, cultural, or genetic significance
- **Jam:** A sweet spreadable product made by cooking fruit with sugar to a gel-like consistency, often containing whole or pieces of fruit
- **Microgreens:** Young, edible greens harvested at an early stage, typically within a couple of weeks of germination, prized for their intense flavors and nutritional content
- **Mulching:** The practice of covering the soil around plants with a layer of organic or inorganic material (mulch) to conserve moisture, suppress weeds, and regulate soil temperature
- **Novice Gardener:** A gardener with limited formal training, education, or professional background in the subject matter, possessing some knowledge but lacking accreditation
- **Oils:** Extracted from fruits, seeds, or nuts, oils serve various culinary purposes. Olive oil, for example, is pressed from olives and is a common cooking and salad oil with distinct flavors based on the olive variety and processing methods

- **Pickling:** The preservation of harvested produce, typically cucumbers or other vegetables, in an acidic solution, often vinegar, along with various spices, to create pickles with a distinct flavor profile
- **Perennials:** Plants that live for more than two years, often returning each growing season, providing long-term stability in a garden
- **pH Levels:** A measure of the acidity or alkalinity of the soil, influencing nutrient availability to plants. Adjusting pH levels can optimize conditions for specific crops
- **Plant Care Reminders:** Notifications and reminders within the app that alert users to water, fertilize, prune, or perform other care tasks for specific plants based on their individual needs and schedules
- **Post-Harvest:** The phase following the harvest, including the processes involved in transforming a crop into a product
- **Preserves:** Similar to jam, preserves are a sweet spread made by preserving whole or large pieces of fruit in a sugary syrup
- **Product:** The end goal of a crop after harvesting, ranging from wine to jam or any other item that can be produced in the post-harvest stage

- **Raised Bed Gardening:** Cultivating plants in beds elevated above ground level, often enclosed by frames, allowing for better soil drainage, warmer temperatures, and easier accessibility
- **Relish:** A condiment made from chopped fruits or vegetables, often pickled, and seasoned with spices, vinegar, or sugar, used to enhance the flavor of savory dishes
- **Syrup:** A thick, sweet liquid often made by boiling sugar or fruit juice, used as a topping for pancakes, waffles, desserts, or in beverages
- **Thinning:** The practice of selectively removing excess seedlings or fruits to allow the remaining ones to grow more robustly, ensuring proper spacing and resource allocation
- **USDA Hardiness Zones:** A zoning system created by the United States Department of Agriculture (USDA) to classify regions based on temperature extremes. Ranging from 1 (coldest) to 13 (warmest), these zones guide gardeners in selecting plants adapted to their local climate, ensuring successful cultivation
- **Weather Integration:** The incorporation of real-time weather data into gardening apps, offering users insights into current and forecasted weather conditions to assist in garden planning and care

- **Wine:** An alcoholic beverage produced through the fermentation of crushed grapes or other fruits, with variations in flavor, aroma, and complexity depending on the grape variety, region, and production techniques

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