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| Eastern Oregon University |
| Herbicide Calculator |
| Requirements Document |

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# User Requirements

## Purpose

The purpose of the project is help users choose herbicides to spray their land and apply the herbicides to the land effectively and correctly. There are several factors to consider in making that make this decision. The first factor is what weeds the farmer desires to eliminate. The second factor is to the crop. The farmer must choose an herbicide that is safe on the crop but will eliminate weeds. That can be challenging enough but the farmer will also want to consider the cost of herbicide. This requires knowing the gallons of herbicide needed. Since different herbicides require different concentrations to be effective comparing the price per gallon can be misleading. The website will simplify help the user consider these factors. There are other factors that farmer can consider some will be covered in the application, but the rest are out of the scope of this application.

## Intended Audience

The intended audience can be split into two groups applicator and suppliers. The applicators group is made up of farmers, landscapist, small scale agriculture managers and larger scale noncommercial applicators. The applicators knowledge will range from limited knowledge about spraying and chemicals to knowledgeable. The suppliers are made up of salesmen and Herbicide suppliers. They will be knowledgeable about chemicals and spraying applications.

## Intended Use

The intention of this capstone project is to provide an educational resource for farmers, commercial and non-commercial about spraying. Spraying with herbicides can be a complicated and confusing process with expensive consequence for mistakes. One possible mistake is choosing a chemical that can kill, stunt the growth, or limit the production of the crop. Another is applying the chemicals at the wrong rate. Appling at the herbicides at higher rate can damage or kill the corps or be wasteful in the amount of chemical used costing the farmer money. The farmer could also apply at lower rate could be infective in eliminating the weeds. This would cost the farmer money since they would need to apply the chemicals again. So, the use of combinations chemical sprays is sometimes required which requires even more knowledge. Since some combinations of chemicals will work together, they could have unintended effects such as not working or harming the crops or neutralizing the effects of the herbicide on the weeds. Also, sometimes a single herbicide will do the same job as multiple chemicals. Another problem the website will help with is comparison of costs. Each chemical can require different application rates.

## Scope

The scope of the project will be confined to agriculture and will be location specific to the Washington, Oregon, Idaho, and Montana.

## User needs

The two groups of users will have different use cases. The two user groups are applicators and suppliers.

The applicators will use the website for:

* Determine the sprays and chemicals that are safe on their crops and effective on their weeds.
* Calculate gallons of herbicide per tank.
* Calculate the gallons of water per tank.
* Calculate the amount of chemical to use for the field application.
* Calculate price of the herbicide.

The Suppliers will use the website for:

* Adding their herbicides to the website.
* Advertising and educating the applicators on their products

# System Requirements

The following list outlines the requirements for the website.

## Functional Requirements

### Field and Sprayer Information Form

This input will allow the user to enter the size of the field in acers. It will also allow the user to enter the size of tank in gallons and sprayer rate in gallons per acre. After inputting greater than zero for all the values, the website will advance the user to the Crop Input Form.

### Crop Input Form

This input field will allow its user to select one or more crops that are grown in the field which the farmer does not wish to harm. After the user inputs one or more crops, the website will advance the user to the Weed Input Form.

### Weed Input Form

Weed input allows the user to select one or more weeds that the user wishes to eradicate from the field. The website will take the inputs and generate a list of suitable herbicides. After the user inputs one or more weeds, the website will advance the user to the Spray Selection Form.

### Spray Selection Form

The suitable sprays will not harm the crop or crops and be effective in killing the weeds. The list will be sorted in effectiveness and the number of weeds in the list that each spray can eliminate. The list will also provide the estimated cost of each spray based on the price per gallon and the pints per acer of the herbicide, the list of weeds each spray is able to eliminate out of the list weeds the user provided, and a calculated rating using the effectiveness rating for each weed. The user will be able to select from the list sprays. The selection will then advance the user to the Result Screen.

### Result Screen

The website will take the selected spray and perform calculations based on the acreage of the land and the recommended application rate of the herbicides. The website will then output the amount of chemical to purchase along with the estimated cost. It will also provide the gallons of herbicide and gallons of water for each tank.

### Supplier Login Form

The supplier will be able to login into the website. The supplier will login with a username and password setup by the website administrator. With a valid username and password, it will send the user to the New Herbicide Form.

### New Herbicide Form

The suppliers will be able to add new chemicals to the website. The supplier will need to input what crops the chemicals are safe to use on. The supplier will also need to enter what weeds the chemical is effective on. They will need to be able to include the price. Finally, they will need to apply a rating to the chemicals for the effectiveness of the chemical on the weed. Alternatively, the supplier will be able to upload an Excel File with the information contained in it. The supplier will submit the form and the website will add the herbicide to the database.

## Usability

### User Interfaces

* Web page
  + Will use a series of forms to provide the user with suggestions for herbicides.
* Login Page for suppliers
  + Uses a web page to login in with a username and password

### Hardware Interfaces

* Up to date web browser
* Windows based PC or Windows Laptop

## Optional Requirements

The following is a list of optional requirements:

* Support for Mobile browsers,
* Support for Apple based browsers
* Support for Linux based browsers.

# Non-Functional Requirements

This is the list of nonfunctional requirements.

## Programming languages

### Python

The programming language that will be used to manage interactions between the web browsers and the Flask server.

### SQL

Structured query language will be used to create and interact with the MySQL database.

### HTML

HTML will be used to generate the be used to create the user interphase.

## Host Operating System

Ubuntu will be the host operating system. It will be running a MySQL database and Flask Server. The server will require at least a 2 GHz dual core CPU, 4 GB of System Memory, and 25 GB of storage space hard drive or SSD.

### MySQL

MySQL is a database server system. It is opensource and free to use. It is managed by the Oracle corporation. The database will be used to store the information needed such as crops, weeds, and chemicals.

### Flask

Flask is a Micro Web Framework. It is programmed and managed using Python.

## Development Environment

### Visual Studio Code

Visual Studio is a code editing program. It will be used to edit the python and HTML programs.

### Data Grip

Data Grip is an IDE and an interphase for databases like MySQL.

# Sources

<https://www.clemson.edu/cafls/research/weeds/management/herbicide-list.html>

<http://www.cdms.net/Label-Database/Advanced-Search#Search>