

Calculation of Plant Water Relation Formulae by Using Visual Studio.

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ABSTRACT

In agricultural research knowledge of plant water relation is important because water is essential for plant vegetative growth, and vegetative growth determines the productivity. In every field experiment it is essential to know the soil moisture content for proper water management of crop. Also, whatever water given to the field is completely used or not for production is very important and is calculated by water use efficiency. Variable used to predict Photosynthesis and production; evapotranspiration refer tool for crop growth. Relative leaf water content is essential to know the drought stress on the leaf. So, plant water relation gives idea about water is properly utilized or not. These parameters determined by taking observations and calculating the result. But when we have large number of samples then it takes lot of time to calculate each Parameter and manual calculations may do some mistakes. If we give water and crop management practices according to faulty data it will directly apply on Yield. Visual studio provides base for correct result with less time.

Microsoft Visual Studio is a unified spread environment from Microsoft. It is used to develop CP programs, in addition to websites, web apps, web services and mobile. Visual Studio 2022 on Windows is now a sixty-four-bit application. This means you can open, edit, run, and debug even the biggest and most complex solutions without running out of memory. With advancements in technology day-by-day, Visual Studio Code is going to play a pivotal role in the development of

software. Use of Information technology (IT) in agriculture gives advancement and digitization.

Key Words: Productivity, Plan water relation, Visual studio, IT, Advancement.

I. INTRODUCTION

Indian economy is relying on agriculture. The utmost agriculture in Bharat is rain fed and hence, the annual rain affects the economy of that year in Bharat. Currently rainfall is declined. In geographical area due to the severe limitation of water resources in many areas, the drought is most vital poignant stress on crop. World wide, the volume of water available for agricultural and horticultural is decreasing. Day by day population is exaggerated and land holding per person is reduced. Growing population demand lot of food need; thus, it's terribly essential to use water such method that it offers higher water use potency for obtainable land. Thus, correct water management is important. Water management refers to artificial ways and means to provide a specific quantity of water at an appropriate time to the effective root zone depth of crop deriving maximum water for higher application efficiency and water use efficiency. (A.M. Michael, 2007) These circumstances are readily tickled by drip means of drip irrigation system. Under drip irrigation system it is possible to apply minute quantity of water based on evapotranspiration of the plant (Stegman et.al., 1983). was studied on water management in pomegranate. The result demonstrates that pomegranate grower benefits with irrigation technologies. The main benefit would be in saving

water, improving productivity and fruit quality Meshram et.al., (2010). Irrigation application has affected leaf water potential values of tested varieties in general Hepaksoy et.al., (2009).

By keeping these points in mind, the study conveyed on Calculation of Plant water relation formulae with advancements in technology. Visual Studio Code goes to play a crucial role within the development of application. With its progression and new settings, which can change users to work with it from any place, it is definitely "THE THING" to one before everybody during this ever-increasing IT market.

Microsoft Visual Studio uses Microsoft development platforms like as Windows API, Windows Forms, Windows Presentation Foundation, Windows Store and Microsoft Silverlight. It will manufacture both native code and managed code. Visual Studio supports thirty-six different artificial languages and permits the code editor and program to support (to varied degrees) nearly any programming language, provided a language-specific service exists.

Constitutional language includes C, C++, C++/CLI, Visual Basic .NET, C#, JavaScript, Typescript, XML, XSLT, HTML, and CSS. Support for different languages like as Python. Purpose of this project is to use IT in Agricultural analysis for correct results with less time as well as introduce IT in agricultural for Agricultural advancement.

1. Existing System

The Existing system is totally manual. The calculation of plant water relation formulae contains different parameters. These formulas are complex to calculate with the use of calculators. These Formulae not needed for one time but during crop period it is needed for crop management practices. It is purely paper based to store the records of every time calculated values of those formulas. The computations are done with calculator by entering each appreciate of formula manually in the calculator. It is long lasting process.

1.1 Limitations in now existing System

There are unit bound limitations in system, that areas follow: -

- 1) There are unit numerous steps in every formula concerned in Plant water relation formula, therefore it's thought to handle manually.
- 2) Manually computations are tough to estimating numerous parameters during this every formula

with completely different Values in step with crop growth stage and weather conditions therefore longer time needed.

- 3) For recording purpose, it ought to be noted in paper, therefore probabilities of losing the information are increases.
- 4) It is difficult to search the old record of data.
- 5) Manually calculations include embrace additional errors with less accuracy.

2. Planned system

The proposed system is deals with the practically of calculations of plant water relation formulae

To remove the intricate, lapse and difficulties the proposed system is developed. These difficulties can take place at the time of managing the inputs to farm like irrigation, fertigation and different crop management practices. Today in the digitalization word paper work is shifted to laptop works with several software's. So the students, researchers are coming under the one roof to learn about digitalization and mechanization. Manually calculations of plant water relation formulae on the paper are very complex method to find the accurate value of the specific Parameter. Also, by mistake its probability to position wrong values in formulae. Supported the result we've got figure on crop growth Parameters. It's important to urge correct result.

So, get rid of these Constraints "Calculation of Plant Water Relation formulae by victimization Visual studio" has been developed. The planned system "Calculation of plant water relation formulae by using Visual studio" deals with all the activities which are done by the agriculturist for Crop management practices. This paper is to be however info communication technology scale back the prolonged manual work load and provide the accurate results of the correct formulas. The information can store in the database and we can use it whenever we needed.

2.1 Usefulness of planned System: -

- Supports multiple programming languages. So earlier, programmers required Web-Support.
- It will discover if any snip of code is left incomplete. Also, common variable syntaxes and variable declarations are crated mathematically.
- It can work on all 3 platforms.
- Usually supports all the programming languages however, if the user/programmer needs to use the artificial language that isn't

supported then, he will transfer download the extension and use it.

- It is connected with Git or can be connected with any other repository for saving the instances.
- The code files are situated in files and folders. The desired code files even have some files, which can be needed for different complex projects.
- Facilitate the user within the code, wherever necessary, to alter it to prompt choice.
- Calculations are completed quick and it saves the time.
- It stores the previous information, so information recovery is feasible simply.
- No ought to information notes down on the paper as a result of it stores digitally in laptop.
- Modified the information as per demand.
- System includes the variety of safety features.
- System ought to be window based mostly, user-friendly and economical.
- Appropriate master tables must be afforded to record relevant data.
- Accuracy are often maintained

Material

This chapter deals with the Calculation of Plant Water Relation Formulae. It includes completely different Calculation formulae and peoples were used whereas developing the software. It includes the configuration of the system and information which is used to develop software. The different Parameters are shown Fig.



Water requirement Moisture content



Leaf Area Index



Relative Leaf Water Content



Yield

4. System Necessities

4.1 Hardware Requirements: -

Content	Description
HDD	10 GB Min, 40 GB counseled
RAM	512 GB Min, 1 GB counseled

4.2 Software Package: -

Content	Description
OS	Windows XP or Higher Operating System
Database	MS-Access 2007
Technologies	ASP.NET with C#.NET
IDE	MS-Visual Studio .Net 2022

5. Connecting the Platform

5.1 Development Platform

The system is developed within the high-level programming language that's, C# with the .net framework. To advance and redesign the software we have used the Microsoft visual studio 2017 version.

5.2 Platforms to run on

To run or use this software package your system should got on top of softwarepackage similarly hardware specifications severally.

CALCULATION OF SOIL WATER AND PLANT RELATIONSHIP FORMULA

1) Crop Water Requirement :(A.M. Michael,2007)

$$W. R. = \frac{E_p \times P_c \times K_c \times C. A. \times W. A.}{IE} \times 100$$

W. R. = Crop Water requirement

W.A-Wetted Are

C.A - Crop Area

E_p – Pan Evaporation

P_C- Pan Coefficient

K_C- Crop Coefficient

2) Moisture content (M.C.) %:(A.M. Michael,2007)

It is essential to know Moisture content of soil before irrigation and after irrigation for proper scheduling of water.

Moisture content calculated by following formula.

$$M. C. = \frac{W_2 - W_1}{W_2 - W_3} \times 100$$

Where, w₁ = weight of sample box (gm.),

w₂ = weight of sample box + moist soil (gm.),

w₃ = weight of sample box + dry soil (gm.)

3)Leaf area index (LAI):

Leaf area index is a dimensionless quantity that characterizes plant canopies. It is defined as the one-sided leaf area per unit ground surface area. LAI directly quantifies canopy structure and can be used to predict primary production and crop growth.

$$LAI = \frac{TLAP}{GAP}$$

Where, TLAP = total leaf area of plant (m²)

GAP = ground area occupied by plant (m²).

Relative Leaf Water Content (RLWC) %:

It estimates the current water content of the current water content of the sampled leaf tissue relative the maximum water content it can hold at full turgidity.

$$RLWC = \frac{FM - DM}{SM - DM} \times 100$$

Where, FM = fresh leaf mass at the time of collection (gm.)

SM = leaf mass at saturated condition (gm.)

DM = sample dry mass (gm.)

Water Use Efficiency (WUE):

$$WUE = \frac{\text{Total yield (Yt)}}{\text{Total Water Applied (Wt)}}$$

Where,

WUE –Water use efficiency (kg/m³)

Y_t- Total yield (Kg)

W_t – Total water given (m³)

Source code for Calculation of Water requirement using Visual studio

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
```

```
namespace Plant_Water_relation_formulae
{
    public partial class Form2 : Form
    {
        public Form2()
        {
            InitializeComponent();
        }
    }
}
```

```
private void label1_Click(object sender, EventArgs e)
{
}
```

```
private void label3_Click(object sender, EventArgs e)
{
}
```

```
private void label4_Click(object sender, EventArgs e)
{
}
```

```
private void label5_Click(object sender, EventArgs e)
{
}
```

```
privatevoid textBox2_TextChanged(object sender,
EventArgs e)
{
}
}
```

```
privatevoid textBox4_TextChanged(object sender,
EventArgs e)
{
}
}
```

```
privatevoid button1_Click(object sender,
EventArgs e)
{
double CA, Pe, Pc, Kc, WA, IE, WR;
CA =Convert.ToDouble(textBoxCA.Text);
Pe = Convert.ToDouble(textBoxPe.Text);
Pc=Convert.ToDouble(textBoxPc.Text);
Kc = Convert.ToDouble(textBoxKc.Text);
WA
=
Convert.ToDouble(textBoxWA.Text);
IE = Convert.ToDouble(textBoxIE.Text);
WR = CA * Pe * Pc * Kc * WA / IE;
textBoxWR.Text = WR. ToString();
}
}
```

```
privatevoid button2_Click(object sender,
EventArgs e)
{
}
}
}
```

Source code for Calculation of Moisture Content formula using Visual studio

```
using System;
usingSystem.Collections.Generic;
usingSystem.ComponentModel;
usingSystem.Data;
usingSystem.Drawing;
usingSystem.Linq;
usingSystem.Text;
usingSystem.Threading.Tasks;
usingSystem.Windows.Forms;
```

```
namespacePlant_Water_relation_formulae
{
publicpartialclassForm3 : Form
{
publicForm3()
{
InitializeComponent();
}
```

```
}
privatevoid label4_Click(object sender, EventArgs
e)
{
}
}
privatevoid label1_Click(object sender, EventArgs
e)
{
double W2, W3, W1, MC;
W2 =Convert.ToDouble(textBoxW2.Text);
W3 = Convert.ToDouble(textBoxW3.Text);
W1 = Convert.ToDouble(textBoxW1.Text);
MC=100*(W2-W1)/(W2-W3);
textBoxMC.Text = MC.ToString();
}
}
}
```

Source code for Calculation of Water Use efficiency formula using Visual studio

```
using System;
usingSystem.Collections.Generic;
usingSystem.ComponentModel;
usingSystem.Data;
usingSystem.Drawing;
usingSystem.Linq;
usingSystem.Text;
usingSystem.Threading.Tasks;
usingSystem.Windows.Forms;
```

```
namespacePlant_Water_relation_formulae
{
publicpartialclassForm6 : Form
{
publicForm6()
{
InitializeComponent();
}
```

```
privatevoid button2_Click(object sender,
EventArgs e)
{
}
}
```

```
privatevoid button1_Click(object sender,
EventArgs e)
{
double Yt, Wt, WUE;
Yt= Convert.ToDouble(textBoxYt.Text);
Wt= Convert.ToDouble(textBoxWt.Text);
WUE= Yt/Wt;
```

```

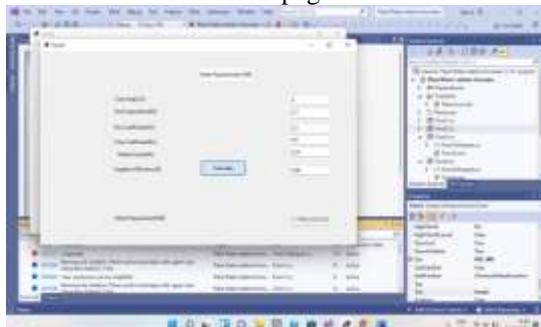
textBoxWUE.Text = WUE.ToString();
    }
}
}

```

II. RESULT AND DISCUSSION



Homepage



Water requirement

III. CONCLUSION

This study tells us about calculation of Plant water relation Formulae by using Visual Studio. Plant Water Relation Formulae is important in every field experiment. If we consider particular crop it has to need these parameters in the Whole crop period again and again. It is mainly used to predict the base for Crop management practices such as irrigation, Fertigation. Formulae has parameters. It includes the information about the development the software for the Calculation of Plant Water Relation Formulae. It also contents the

configuration of the system and information about the used to develop software. The system is developed in the high-level computer language i.e., C# language in the .net framework. The use of information communication technology is now growing in the various Faculty. So, it is necessary to increase the use of ICT in the agriculture Research. Agriculture field will be more Advanced and grow due to use of this high technology i.e., Information Technology. Day by day population is increased and land holding per person is reduced. Growing population demand more food need; therefore, it is very essential to use water and land such way that it gives higher water use efficiency for available land. So proper water management and Crop management is essential. The software was developed for different formulae using ASP. NET with C# was used as programming language. It will be very useful software for the agricultural research work as well as for farms. It can used at the scientists, students as well as farmers level to calculate the related formulas in the agricultural Crop management practices

And best crop management practices give Increase in yield. And Net income of farmer will increase.

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