

App for Physiological Seed quality Parameters

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ABSTRACT

Agriculture plays an important role in the economy of our country. Over 58 percent of the rural households depend on the agriculture sector as their means of livelihood. Agriculture is one of the major contributors to Gross Domestic Product(GDP). Seeds are the soul of agriculture. This application helps in reducing the time for the researchers as well as farmers to know the seedling parameters. The application helps the farmers to know about the percentage of seedlings that will grow and it is very essential in estimating the yield of that particular crop. Manual calculation may lead to some error, to minimize that error, the developed app is used. The scientist and farmers require the app to know about the physiological seed quality parameters and to take decisions regarding their farming activities. In this article a desktop app for seed germination percentage and vigour index calculation are developed in PHP scripting language.

Keywords: Seed germination percentage, Seed Vigour Index, PHP, desktop application

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I. INTRODUCTION

In India, Agriculture is the means of livelihood for most of the people. The Information and Communication Technology in the field of agriculture helps in the development of the agricultural sector. Timely relevant information and services to farmers can be done efficiently with the advancement of the Information Technology in the field of agriculture. The development of applications in agriculture helps in enriching the knowledge of farmers[1].

A desktop application is one that runs on the user's laptop or desktop computer. It is offline and does not require internet connection to work in it. The main benefits of this type of application are high efficiency and user interface flexibility.

PHP (HyperText Preprocessor) is an open source general purpose scripting language. It runs on various platforms(Windows, Linux, Unix, Mac OS X, etc.). The language is also compatible with almost all servers that are used today(Apache, IIS, etc.). It can support a wide range of databases.

Seed Germination Percentage and Seed Vigour Index are considered as the seedling parameters. The germination percentage calculation is very essential for farmers to verify whether the seed is suitable for planting or not. Seed Vigour Index is calculated by considering seed germination percentage, root length and shoot length of the particular crop. The vigour index is considered as the

sensitive parameter than the germination percentage. It also helps in the selection of high quality seedlots.

II. REVIEW OF LITERATURE

In order to minimize the difficulties for the beginners, conventional spreadsheets are used for the calculation of seed germination (emergence) measurements, the organization of the final data for statistical analysis and some excel commands are also used[2]. Rice is the staple food of southern India. The area of rice grown globally is 161 million hectare, and the average production is about 678.7million tonnes. The seeds of three rice varieties (Narendra, Sabarmati and Hybrid 312) were collected and kept under four water stress and six salt stress levels. Seed germination, seedling length, dry weight, seed vigor and other parameters were recorded. Narendraand Sabarmati varieties showed better response while Hybrid 312 failed to germinate in all water stress levels. The results of this experiment is helpful in identification of the tolerant varieties which can be used for further studies[3]. Review about measurements of the germination process, with an analysis of the several mathematical expressions included in the specific literature, recovering the history, sense, and limitations of some germination measurements. The limits of the germination measurements were considered to make the interpretation and decisions easier. Time, rate, homogeneity, and synchrony are aspects that can be measured, informing the dynamics of the germination process[4]. The germination characteristics of a seedlot are determined by knowing the species, age of the seeds as well as germination conditions, and the seed pretreatment.

A technique for measuring the speed germination of seeds independent of the completion of the germination[5]. Data analysis method followed in the seed germination and emergence tests are discussed. The review shows that the different interpretation can be drawn by using different formulae. Not only the germination percentage but also the speed the germination, high and low germination events have an impact of the parameters calculated. The Germination Index (GI) is the analysis method that describes the germination percentage/speed relationship[6]. These are the developments and researches that are undergone in the seed germination percentage and seed vigour index. In this paper an application is developed for the calculation of germination percentage and seed vigour index which helps the farmers in estimation of the yield of a crop.

III. APPLICATION FOR SEED GERMINATION PERCENTAGE AND SEED VIGOUR INDEX

Germination percentage is the major influencing factor in seed germination process. Linear correlation in experimental design models applied to seed science and Technology especially while developing model for seed germination, are the existing methods [7][8].

PHP server side scripting language used for creating the app. It runs on a server, embedded in a sites code. Designed to interact with the back end database. It is very efficient in the easy transfer of data from server to browser. It builds Application Programming Interfaces(APIs),which control the data and software a site shares with other apps[9].

Xampp server is an integration package for the development components, the web developers require regardless of the platform they work in. The X in Xampp stands for "Operating systems", the remaining acronyms stand for Apache, Mysql, PHP, Perl. It also integrates many other open source software packages.

3.1 Input

For germination percentage the parameters required are the number of seedlings germinated and the total number of seedlings. In seed vigour index the essential parameters are germination percentage, root length and shoot length.

3.2 Process

The user need to enter the number of seedlings in the specified box and when he/she enter the submit it redirects to another page where the result is generated. For seed vigour index the user is directed to enter the germination percentage value along with root length and shoot length. When the submit button is pressed the result page will appear which shows the seed vigour index.

3.3 Output

The result will be displayed in a separate page showing the germination percentage and seed vigour index[10][11][12].The algorithm for the development of Physiological Seed quality Parameters is discussed below.

3.4 Algorithm

3.4.1.Seed germination percentage

- Step1: Get the number of seedlings germinated from the user
- Step2: Click the submit button, the calculation is performed
- Step3:Seed germination percentage=No. of seedlings germinated/Total No. of seeds*100
- Step4: Calculation is performed and output is displayed.

3.4.2. Seed vigour Index

- Step1: Get the Germination percentage as the user input
- Step2: Get the root length and shoot length as user input
- Step3:After clicking the submit button, calculation is performed.
- Step4:Vigour index= Germination percentage*(root length+shoot length)
- Step5: The output is displayed for vigour index

IV. EXPERIMENTAL RESULTS

The desktop application is created with the help of Xampp server and the resulting outputs are given below. In the Fig.1, introduction about the seed germination percentage is presented. In Fig. 2 shows the user Input page, the user needs to enter the Number of seedlings emerged for a particular crop. In Fig. 3 shows the output page, the germination percentage is displayed.

4.1Seed Germination percentage

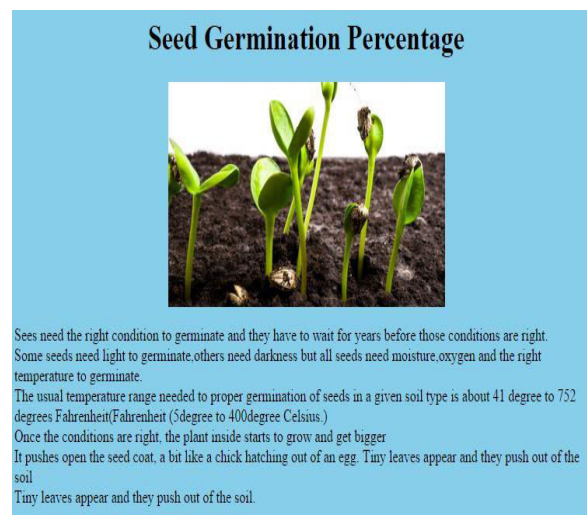


Fig 1.Main page of seed germination percentage

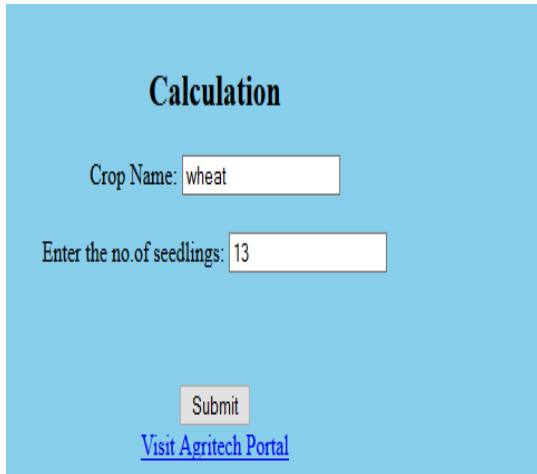


Fig 2. User Input page

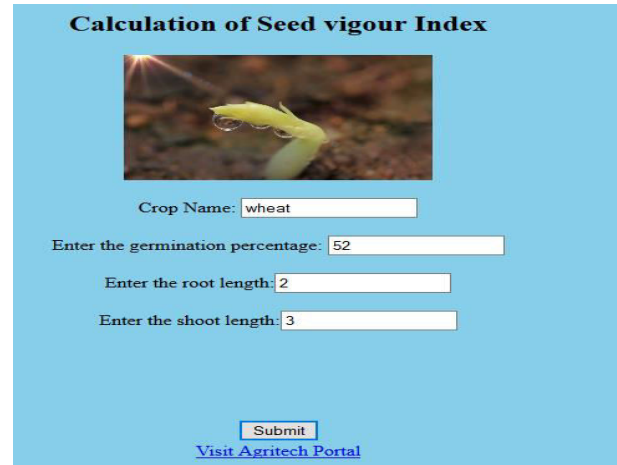


Fig 5. User Input page

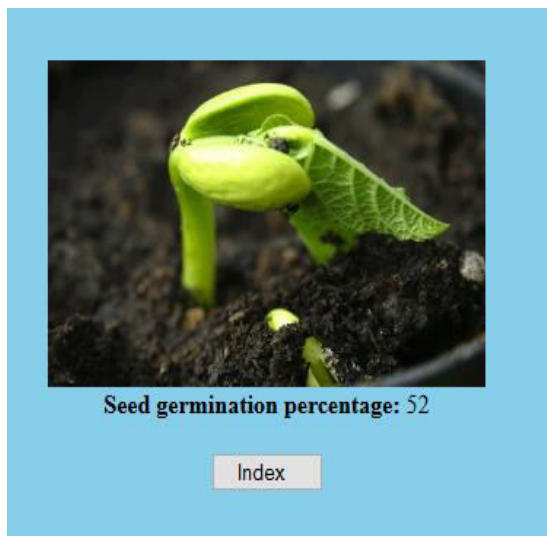


Fig 3. Output page



Fig 6. Output page

4.2 Seed Vigour Index

In Fig. 4 the introduction about seed vigour index is given. In Fig. 5 shows the user input page, the user needs to enter the germination percentage, root growth, shoot growth. In Fig. 6 the output page displays seed vigour index.

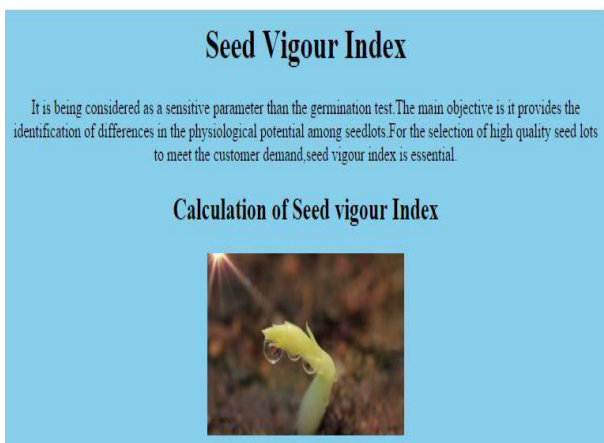


Fig 4. Main page

V. CONCLUSION

Agriculture is the backbone of our nation. To incorporate ICT in agriculture the Physiological Seed quality Parameters app is developed. The desktop application created for seed parameters calculation is useful for the scientist, agricultural students and farmers. The developed application will help the farmers to know all seed parameters. In future developed app may be integrated with mobile platform and to get the app in the regional language.

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Biographies and Photographs



Saritha.D has completed her Undergraduate Degree in Agricultural Information Technology from Tamil Nadu Agricultural University. She did her Internship Programme in IIOR, Hyderabad on “Development of Preliminary Database Tool for Laboratory Resource and Data Management”.



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Dr. M. Kalpana obtained her B.Sc Degree (Statistics) in 2001. She is a rank holder in under graduate degree. She obtained her M.C.A degree from Maharaja College for women in 2004 and M.Phil in Computer Science at Madurai Kamaraj University and her Ph.D in Computer Science in Bharathiar University during 2014. She has to her credit three books, 4 papers in National Conference and 2 paper in International Conference, 12 papers in International Journals and two book chapters in IGI Global, U.S.A. She has also coordinated for the training offered by National Horticultural Mission (NHM) to the State Agricultural and Horticultural officers and prepared manuals. She is a Life member of International Association of Engineers (IAENG), International Association of Computer Science and Information Technology (IACSIT) and member of Internet Society (ISOC). She has been awarded Bharat Jyothi Award from India International Friendship Society.



Dr.V.Manonmani, Professor (SST), Tamil Nadu Agricultural University is having twenty years of experience in teaching and Research. She has handled more than 15 courses for under graduate students, PG and Ph.D students of Agriculture and Horticulture by applying innovative methods like e-content and also formulated manuals and guided 10 PG and 3 Ph.D scholars. She has published more than 40 articles in nationally and internationally reputed journals. She also developed seed priming technologies for small millets, groundnut, sunflower, brinjal and bittergourd. She obtained four national awards for the outstanding contribution in education and research which are R.V.Swaminathan Medal for Best Student in Seed Technology, Best Popular Article award, V.C.Vellingiri Gounder Medal for the Best Research Worker and Outstanding women educator award. She obtained several externally funded schemes as principal and Co-Principal Investigator to the tune of more than 60 lakhs under GOI, UGC and private agencies for strengthening the seed research programme.