



Research Article

DESIGN AND DEVELOPMENT OF MOBILE APPLICATION FOR MILLETS

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Received: July 02, 2022; Revised: July 26, 2022; Accepted: July 27, 2022; Published: July 30, 2022

Abstract: India is an agriculture leading country. Millets are indigenous to many parts of the world. Millets or nutri-cereals are high-energy foods; that are cultivated as early as 10,000 years ago. The millets are cultivated in degraded and marginal lands that receive very less rainfall and are poor in soil nutrient content. To increase the yield, new cultivation technology needs to be introduced. To disseminate the essential information to the farmers using the widespread availability of smartphones and Internet. This paper presents a mobile-apps directed millets to the agricultural sector designed in Android Operating System. The Millets AMPP App include the information about Origin and History, Area and Distribution, Botanical Description, Season And Varieties, Morphological Description, Crop Management as Climatic Requirements, Soil, Field Preparation, Seed and Sowing, Manures and Fertilizers, Water Management, Weed Control, Crop Protection as Pests and Diseases, Harvesting and Threshing, Yield, Nutrient Information, Health benefits, Machinery and value added products for the millets Maize, Sorghum, Kambu, Ragi, Pannivaragu, Samai, Thina, Varagu, Banyard Millet. The detailed information is designed and presented in the form of an Android application- AMPP Millet App. The paper also discusses the steps to develop applications and the content available.

Keywords: Millets, Android studio, Crop Management, Crop protection, Mobile Application

Citation: Prema P., et al., (2022) Design and Development of Mobile Application for Millets. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 14, Issue 7, pp.- 11454-11457.

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Academic Editor / Reviewer: Dr Pramod Kumar Mishra, Dr A. K. Singh

Introduction

The word millet is derived from the French word "mille" which means that a handful of millet contains thousands of seed grains [1]. Millets are categorized into two major groups major millets, such as, sorghum and pearl millet. Minor or small millets, such as, finger millet proso millet, foxtail millet, kodo millet, barnyard millet and little millet[2]. Millets are the important staple food of resource for poor farmers in hot and drier regions. Globally millets (pearl millet and minor millets) are cultivated in more than 93 countries [3,4]. About 97% of millets are produced and consumed by developing countries especially in Africa and Asia. Globally, India is the largest grower of millets with 26.6% of the world and 83% of Asia's millet cropping area. Among the continents, the largest area reduction was observed in Asia (148%) [5]. This decline may be attributed to lack of concentrated crop improvement efforts, shift towards high-value cash crops, lack of government policies, and low farm profitability. In the last decade the millet cultivation are continuous declined [6]. Furthermore, integration of sustainable and cost-effective crop management practices is the key to project them as golden crops of the future. In the present article, we summarize the agronomic practices, pest and disease management, irrigation and weed management techniques, machinery for millet and millet food recipe details[7-9] are discussed in the millet app. In global scenario of millet is an importance healthy alternative food.

Material and Methods

Most of the millet's grains are consumed, where they are produced as 97% of millets are cultivated by developing nations especially by resource poor and marginal farmers.

The stages of mobile application development life cycle are Planning, discovery, design, development, release and maintenance. The app has designed with the following millet, the table shows the millet and its characteristics [10-13].

Discovery phase

In the Discovery phase, the details required for mobile app development has collected. The discovery phase should include the following stages: research into competitors; feature mapping; technical requirements specification; the setting of costs and deadlines. In the millet app the details of agronomics practices, plant protection, Nutrient, Value Addition of millets, Marketing for millets, Processing Centre, Millet processing machinery, seed availability for millets such as Maize, Sorghum, Cumbu, Ragi, Panivaragu, Samai, Tenai, Varagu, Kudiraivali .

Design

The millet app project has unique look and feel. The designers work to make the app in three defined steps.

Sketch

The first step is sketching. At this stage, the concept of the app has designed.

Business analysis

- Idea evaluation – a preliminary stage, when experts investigate the idea, correct it, give their advice and create a rough logic for it.
- Competition analysis – study of activities of other players in the market.

- SWOT-analysis – evaluation of strengths and weaknesses of the product, insights into opportunities and other aspects.

- ROI calculation – assessment of the future app market performance help realize the real value and adjust budget accordingly.

- Requirements scope – summing up requirements for the future product at all levels.

Table-1 Millets and their special characteristics

Millet	Common name	Botanical name	Special characteristics
Sorghum	Great millet, Jowar, Kafir corn, Guinea corn, Kaolin in China, and Milo in Spain	<i>Sorghum bicolor</i>	Tolerate moisture stress and high temperature better than any other crops
Pearl millet	Bajra, Cattail millet, Black millet, German millet	<i>Pennisetum glaucum</i>	Grow in arid and semi-arid region, richest source of folic acid
Finger millet	Ragi, Wimbi, Mandua, Nachni, Kapai, Nagli, Marua	<i>Eleusine coracana</i>	Wider adaptability, rich source of calcium
Proso millet	Cheena, Common millet, Broom millet Sahib	<i>Panicum iliaceum</i>	Short duration, tolerant to heat and drought
Foxtail millet	Indian paspalum, Kangni, Water couch, Italian millet	<i>Setaria italica</i>	Short duration, tolerant to low soil fertility and drought
Kodo millet	Kodo, Ditch millet, Creeping paspalum	<i>Paspalum scrobiculatum</i>	Long duration, grown well in shallow and deep soil, rich in folic acid
Barnyard millet	Sawan, Jhingora, Kudraivali, Oodalu	<i>Echinochloa frumentacea</i>	Fastest growing, voluminous fodder
Little millet	Kutki, Samai, Samalu, Hog millet	<i>Panicum sumatrense</i>	Short duration, withstand both drought and waterlogging

Mobile strategy

- Market research – this study shows the overall situation on the market to help adjust the concept of the product to current demand.
- Defining user personas – understanding who is your target audience is crucial in crafting advertising approach.
- Technologies & tools assessment – study of specific tools required for the industry and select a set of technologies to meet the objectives of the project.
- Complex promotion strategy – a step-by-step action plan for acquisition and retaining users.



Fig-1 Life cycle of App Development

Technical documentation

Also known as a technical specification or a software documentation, this paper is a complex manual of your product, outlining requirements, business logic and leading your specialists through all stages of the project:

- Makes your software universally understandable.
- Provides flexibility for future changes.
- Adds value to your app by providing a clear manual.
- Helps to keep control of your own product.
- Allows reusing existing parts of the developed application.

Prototyping

Prototyping is a process of defining a concept in visual terms and evaluating how the app might develop to correct a misconception.

- Creating a sketch – the draft version of your app on paper that sets up the main logic, number of screens and the way they interact with each other.
- Creating wireframes – provides the visualization of the draft structure.
- Creating a clickable prototype – helps to find out and analyze all possible use cases, discover logical breaks and technical inconsistencies in the original idea.
- Designing app skins – collecting all wireframes and put them together to get the final design.

A prototype is a clickable model of an app that looks just like the real app. The process of prototype creation in more detail. The Figure shows the millet app design. It shows the image of nine millets, machinery, Value added products and market information

Wireframe

Next, to transfer it onto a tablet and prepare a black and white model of each screen. These already look more or less like a finished design, but without the actual content and colour scheme having been added. The [Fig-3] shows the content title for each millet.



Fig-2 Millet Mobile App Prototype

Code Development:

This segment usually consists of two main parts

- Front-end development – client-side development, creating a presentation layer of the software for a direct user interaction with it.
- Back-end development – a server/database part of development, connecting a front-end part of the mobile app with the data access layer.

Development

The millet app design is ready, but it's still a lot of work to turn a model into a fully-functional product. This is where programmers step into the game and code all the necessary features.

The development process can be divided into two parts.

- The frontend. This is the user side, so-to-say, or the face of the program with which users interact. The task of a front-end developer is to guarantee a flawless user-friendly experience.
- The backend. This is the hard functional part that guarantees the functioning of the whole system. Backend usually refers to the server-side of the application. It's responsible for all the operations, calculations and, finally, for how reliable the app is. The detailed information about each heading of each crop is listed if the user the link.

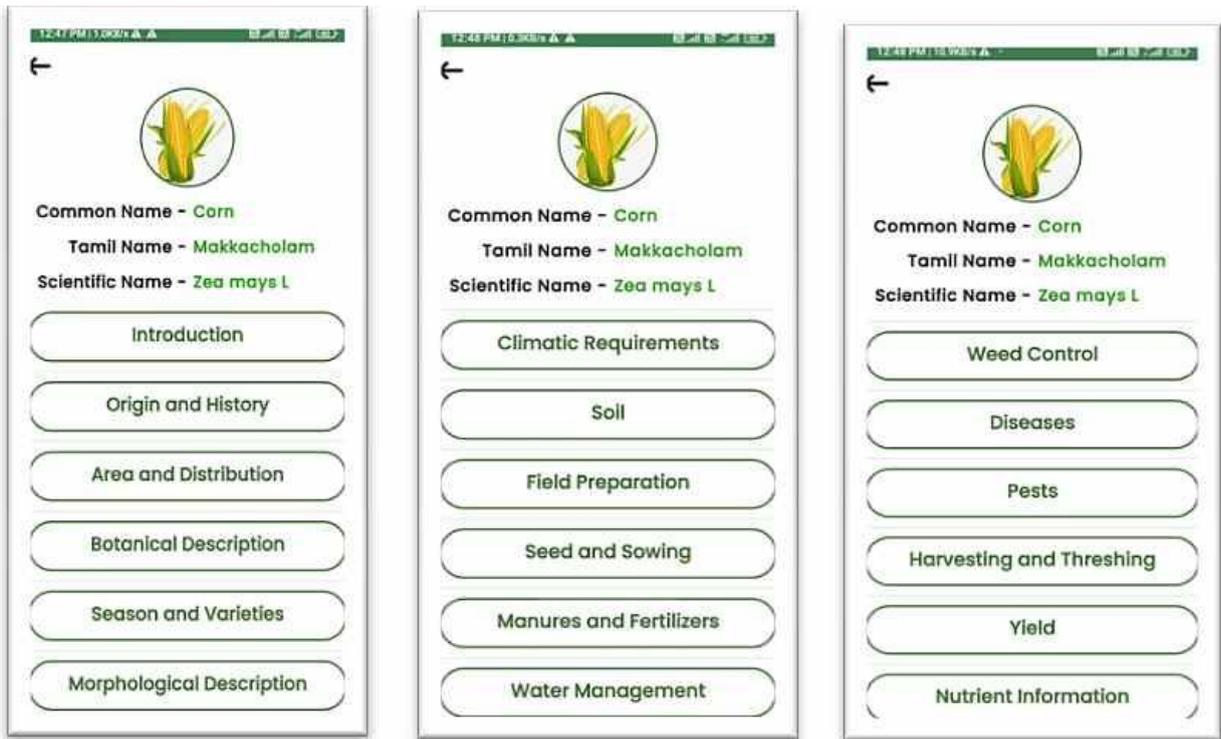
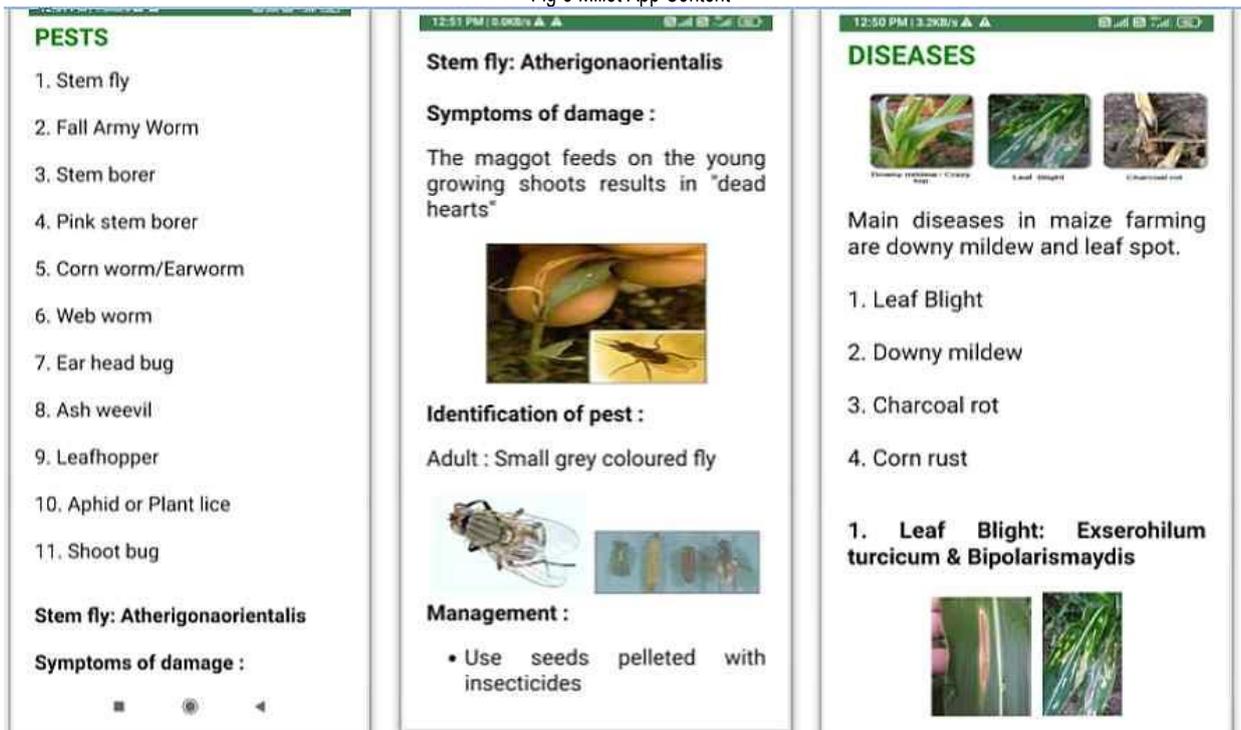


Fig-3 Millet App Content



Quality Assurance

Proper testing should cover up to 90% of all potential risks. To optimise the testing process, some of the checks can be done via automatic testing, others via manual tests. It's always easier to fix bugs before release than to keep coming back to this step over and over again after published the app to the store and collected negative user reviews.

In the agile development, it's usually a continuous process following every sprint of development

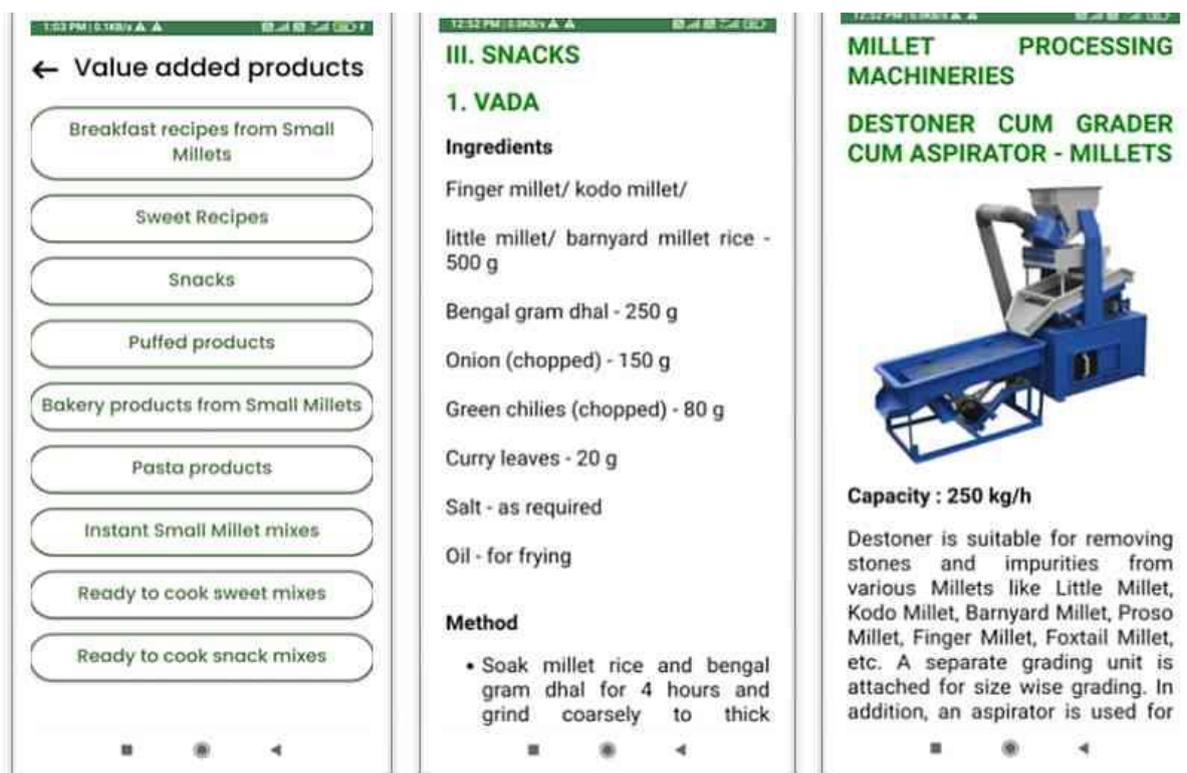
- Compatibility testing – running the app on different devices and screen sizes.
- Interface testing – checking the navigation, menu and buttons performance.
- Device compatibility testing – checking how the app looks and performs on

various screen sizes.

- Low-level resources testing – examination of the app in conditions of low battery, slow internet connection, etc.
- Security testing – provides quality assurance of user's data safety.
- Beta testing – giving users access to the app to get feedback.

Publishing & Maintenance

- Publishing of the app and following updated versions to a chosen app store.
 - Infrastructure support – either you have admin panel to post on or cloud service attached, you'll need to make sure it functions fully.
- Finally, publish the application to the store or offer it to the farmers and scientist.



Conclusion

By virtue of their unique nutritional profile, tremendous health benefits and C4 photosynthetic pathway, millets are well-suited crops to diversify cropping systems for climate resilient agriculture. Since ages, millets are being grown by resource poor farmers of drylands and tribal communities inhabiting less productive and fragile ecosystems. However, the growing awareness about their potential health benefits and industrial uses resulted in the renaissance of millets. Shrinking of global millet cropping area is the main concern associated with millet production. Lack of improved cultivars, agricultural inputs, and policy support are major limiting factors associated with lower productivity of millets and shrinking area. Using the cultivation practice techniques and mechanization technologies the area of millet cultivation will be increased.

Application of research: The Millet App can be easily access in the mobile. Students, Scientist, farmers and public to know about the package and Practices of different millet (Maize, Pearl Millet, Banyard Millet, Proso Millet, Finger Millet, Little Millet, Sorghum, Kodo Millet, Foxtail Millet) and to know the preparation methods and Value-added products for Millet especially for women and entrepreneurs.

Research Category: Mobile Application for Millet cultivation

Acknowledgement / Funding: Authors are thankful to Tamil Nadu Agricultural University, Coimbatore, 641003, Tamil Nadu, India

****Principal Investigator or Chairperson of research: Dr P. Prema**

University: Tamil Nadu Agricultural University, Coimbatore, 641003, India

Research project name or number: Research station study

Author Contributions: All authors equally contributed

Author statement: All authors read, reviewed, agreed and approved the final manuscript. Note-All authors agreed that- Written informed consent was obtained from all participants prior to publish / enrolment

Study area / Sample Collection: Tamil Nadu Agricultural University, Coimbatore

Cultivar / Variety / Breed name: Millets

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.
Ethical Committee Approval Number: Nil

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