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Design and development of mobile application for millets

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Abstract

India is an agriculture leading country. Millets are indigenous to many parts of the world. Millets may have been consumed by humans for about 7,000 years and potentially had a pivotal role in the rise of multi-crop agriculture and settled farming societies. Every day new technology are introduced for increasing the yield and processing technology. Hence, the dissemination of information to the farmers at the time when it is required becomes very important. With the widespread availability of smartphones and Internet, there is a huge potential for supplying essential information via this means. 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, Thinai, Varagu, Banyard Millet. The detailed information are 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

Introduction

The word millet is derived from the French word “mille” which means that a handful of millet contains thousands of seed grains (Taylor and Emmambux 2008). They are broadly categorized into two major groups (1) major millets, viz., sorghum [*Sorghum bicolor* (L.)] and pearl millet [*Pennisetum glaucum* (L.)]; (2) minor or small millets, viz., finger millet [*Eleusine coracana* (L.) Gaertn.], proso millet [*Panicum iliaceum* (L.)], foxtail millet [*Setaria italica* (L.) Beauv.], kodo millet [*Paspalum scrobiculatum* (L.)], barnyard millet (*Echinochloa* spp.), and little millet. 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. 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%), 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. The continuous decline in global cultivated area under millets in the last decades have given them the status of minor or underutilized grains. 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 are discussed in the millet app. In global scenario of millet is an importance healthy alternative food.

Material and Methods

Most of the millets 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,

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development, release and maintenance. The app has been designed with the following millet, the table shows the

millet and its characteristics.

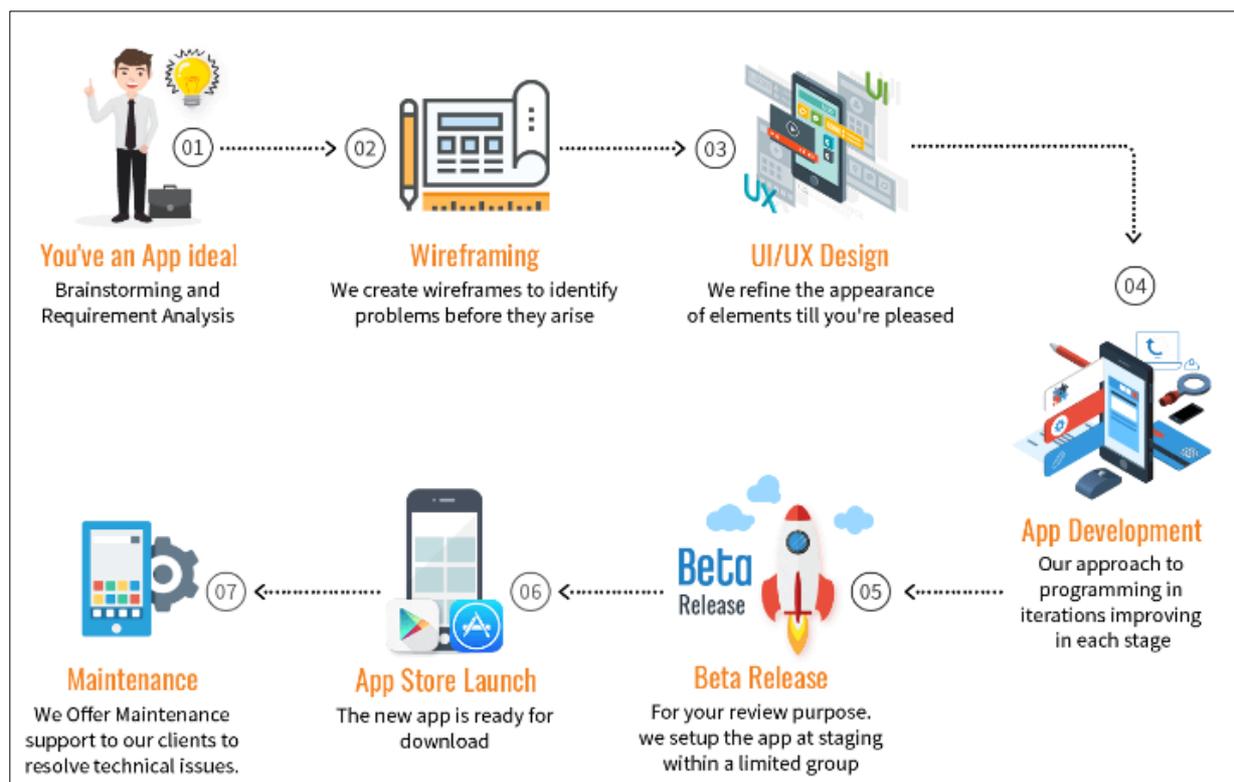


Fig 1: Life cycle of App Development

Table 1.1: Millets and their special characteristics

Millet	Common name	Botanical name	Special characteristics	Reference
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, Kapa, Nagli, Marua	<i>Eleusine coracana</i>	Wider adaptability, rich source of calcium	Seetharam (1998)
Proso millet	Cheena, Common millet, Broom millet	<i>Panicum iliaceum</i>	Short duration, tolerant to heat and drought	Sahib (1997)
Foxtail millet	Indian paspalum, Kangni, Water couch, Italian millet	<i>Setaria italica</i>	Short duration, tolerant to low soil fertility and drought	Jijau (1989)
Kodo millet	Kodo, Ditch millet, Creeping paspalum	<i>Paspalum scrobiculatum</i>	Long duration, grown well in shallow and deep soil, rich in folic acid	Hegde and Gowda (1989)
Barnyard millet	Sawan, Jhingora, Kudraivali, Oodalu	<i>Echinochloa frumentacea</i>	Fastest growing, voluminous fodder	Gupta et al. (2009)
Little millet	Kutki, Samai, Samalu, Hog millet	<i>Panicum sumatrense</i>	Short duration, withstand both drought and waterlogging	Doggett (1989)

Discovery phase

In the Discovery phase, the details required for mobile app development are collected. The details are “How many users with different rights for logging in should your app have? What OS do you want it to work on? What smartphone screens do you want your design to be suited to?”. The discovery phase is, therefore, necessary for the developer to translate human language into technical documentation. A correctly-devised 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 agronomy 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 digital project has its own unique look and feel. The designers work to make your app stand out and do so in three defined steps.

Sketch

The first step is sketching. At this stage, the concept of the app has been 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 helps realize the real value and adjust budget accordingly.
- Requirements scope – summing up requirements for the future product at all levels.

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.

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 is in more detail. ‘The Figure shows the millet app design. It shows the image of nine millets, machinery, Value added products and market information.



Fig 2: Millet Mobile App Prototype

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 figure 3 shows the content title for each millet.

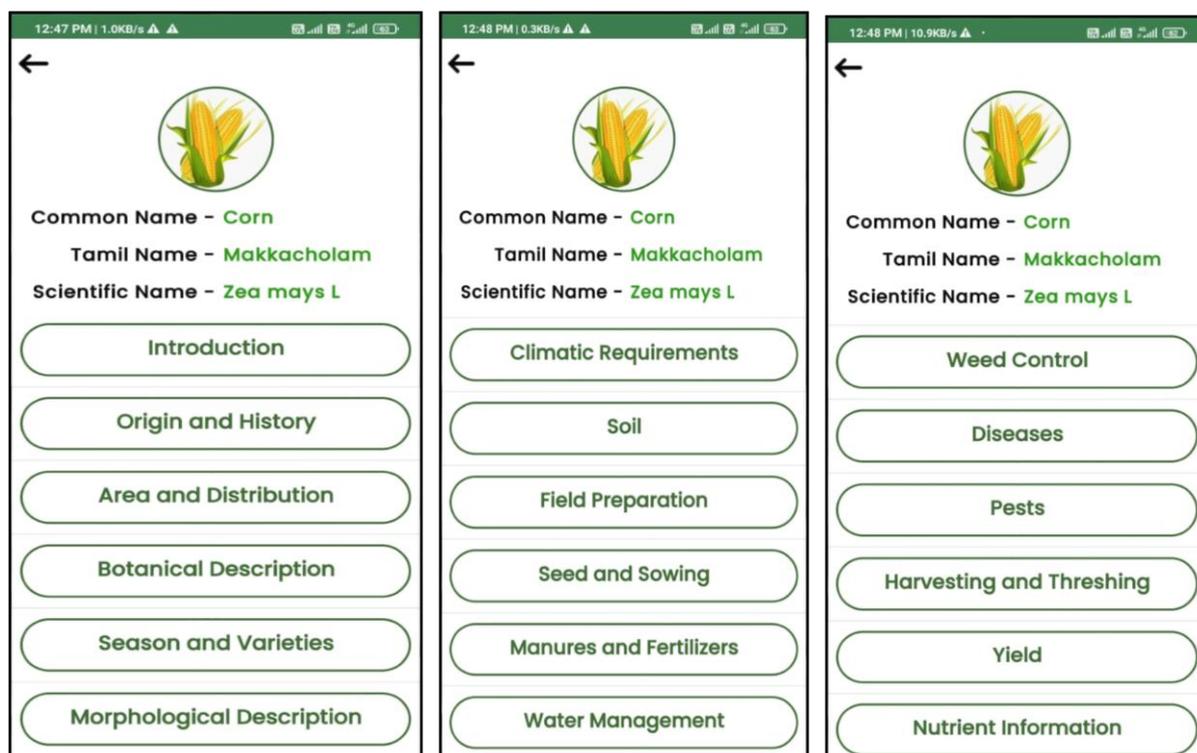


Fig 3: Millet App Content

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 are listed if the user the link.



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 users 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.

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