



Cashew India: an exclusive android application for cashew cultivation

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Abstract

Smartphones and their apps have become integral to communication through voice, text, and video. Consequently, numerous crop-related apps developed by public and private organizations are deployed to effectively disseminate agricultural information and technologies. ICAR- Directorate of Cashew Research is the nodal centre in the country for cashew research and continuously generates new information on cashew cultivation and other aspects. The data on various aspects of cashew cultivation available in the institute has been utilized to develop the Cashew India app. This app gives comprehensive information on cashew cultivation aspects, statistics, markets, economics, success stories, services, and training, aiming to empower different stakeholders of the crop. The efforts and technologies behind the development of this app and its uniqueness among the various apps developed for different crops are elucidated here. The principles adopted in this app can be profitably extended to overcome the inadequacy of existing crop-related apps or to create new ones by the agencies involved in app development.

Key Words: Android Apps, Agriculture, Cashew India

Introduction

Smartphones have made inroads into even villages in India. It is increasingly realized that easier access to required information 24 x 7 through these phones is possible than any other media. More and more youngsters and elders are recently deploying smartphones for their information needs. Mobile applications (apps in short) are an integral part of smartphones and the presence of an app for crop covering cultivation and related aspects would speed up the process of dissemination of information among the stakeholders. It is possible to push and update information periodically through the apps. Further, getting feedback from stakeholders is also easy with such an app in place.

Cashew is an important commercial plantation crop with high export value. The internal demand for cashew in India is increasing rapidly. The area under cashew was predominantly in the coastal areas of the country. However, now it is expanding to non-traditional plain areas of the country. At present, the cashew is cultivated in about 13 states of the country in both coastal and plain areas. The current production and productivity of cashews stands at 11.92 lakh ha with a production of 7.81 lakh tons

and a productivity of 766 kg/ ha (DCCD, 2022-23). Given its quick expansion, the information needs of the farmers in terms of planting material and cultivation aspects are growing. Hence, a wide-ranging platform where stakeholders can easily access the information is very much necessary.

Given the above, the objective was to develop a mobile app giving comprehensive information on cultivation and other aspects of cashew at the ICAR- Directorate of Cashew Research, Puttur. The details of the app, technologies used, and implications of the app are discussed here. Before developing the app, more than 40 crop-related apps available in the Google Play store and respective institute websites were reviewed for their content and design. For instance, Horticultural Crop Cultivation developed by the Indian Institute of Horticultural Research, Bangalore, Comprehensive Rubber Information System developed by the Rubber Board, Oil palm Crop doctor by Indian Institute of Oil Palm Research, Mobile apps on Turmeric, Black pepper, Ginger, Cardamom by Indian Institute of Spices Research, Calicut, Mung advisor by Indian Institute of

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Pulses Research, Kanpur were reviewed with respect to content and design of the app.

Material and methods

ICAR-Directorate of Cashew Research is the nodal centre for cashew research in the country with its headquarters in Puttur, Dakshina Kannada, Karnataka state, India. It also has an All India Coordinated Research Project on Cashew, which coordinates cashew research in 14 different centres spread across the country. The directorate has a countrywide exhaustive information base about cashew cultivation aspects accumulated since 1986, and it is actively involved in generating new information on cashew through research and disseminating it among stakeholders.

The knowledge base of cashew on various aspects such as nursery, planting, and aftercare, manure and fertilizer application, irrigation, pest and diseases, harvesting, post-harvest handling, processing aspects, indigenous technical knowledge, pollination services, etc at the ICAR-DCR (Nayak *et al*, 2011, Nayak *et al*, 2004, Vanitha and Raviprasad, 2019, Sally *et al*, 2017, Balasubramanian and Nayak, 2016, DCCD), was utilized for the development of the app. Similarly, the All India Coordinated Research Project (AICRP) centres on cashew spread across the country have utilized the data specific to their respective states. Initially, an elaborate storyboard was written to cover all aspects related to cashew, given the needs of the stakeholders throughout the country. The app was intended to cover 10 cashew-growing states in 11 languages. The text, photo, and videos on various aspects were prepared and curated by the expert scientists in each centre, keeping in view the limited space. Clarity and simplicity of the topics were given utmost importance to reach a wider audience. Images and videos on various topics were appropriately included.

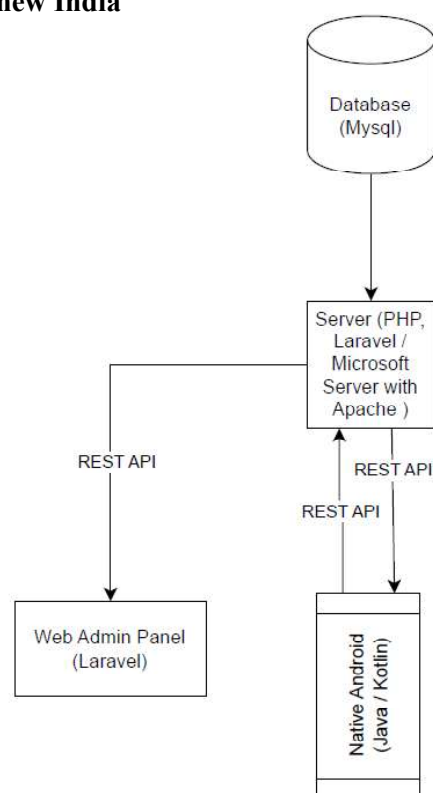
Technology stack

The latest technologies in IT were deployed for developing this app. Native Android Software Development Kit, PHP Laravel Framework to develop the web admin panel, and REST API for the application have been utilized. Windows-based servers, which will run an Apache2 server instance to host the web REST and Admin application, were deployed (Fig. 1)

Testing and evaluation

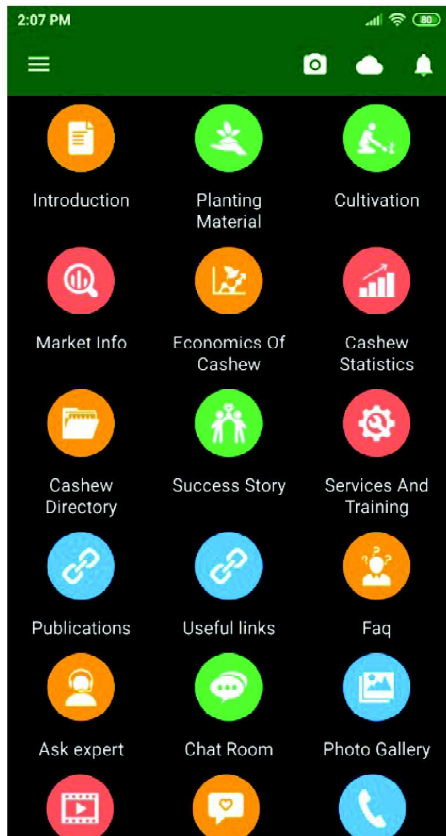
Once developed, Cashew India was thoroughly tested for errors in the software's functioning. Further, individual modules were tested systematically to ensure proper performance. The security features were also tested, along with the ease of use and their overall effectiveness. The app was hosted on the server in the ICAR data centre, and it is made available through the Google Play Store for users to download. The application was further tested in the live environment, and its performance was found to be satisfactory.

Fig 1. Schema of the system architecture of cashew India



Unique features of Cashew India

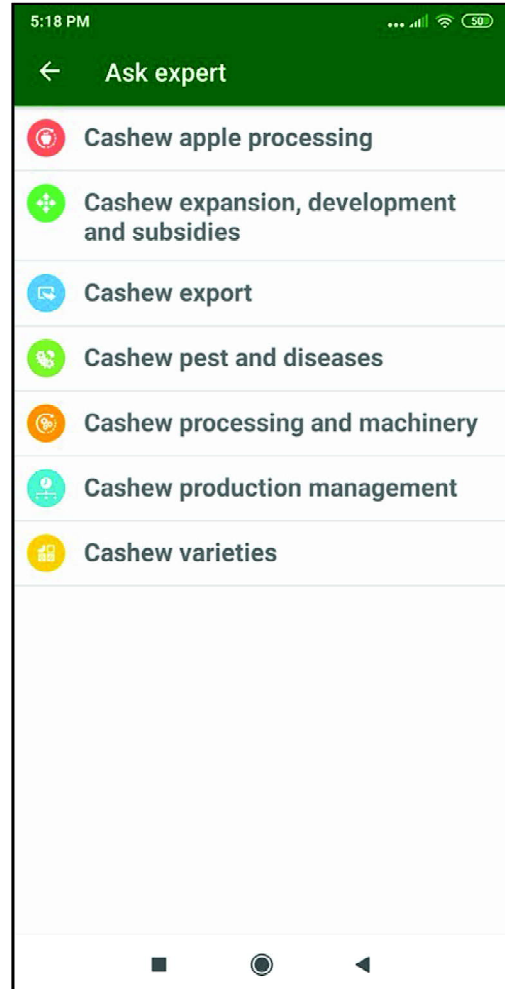
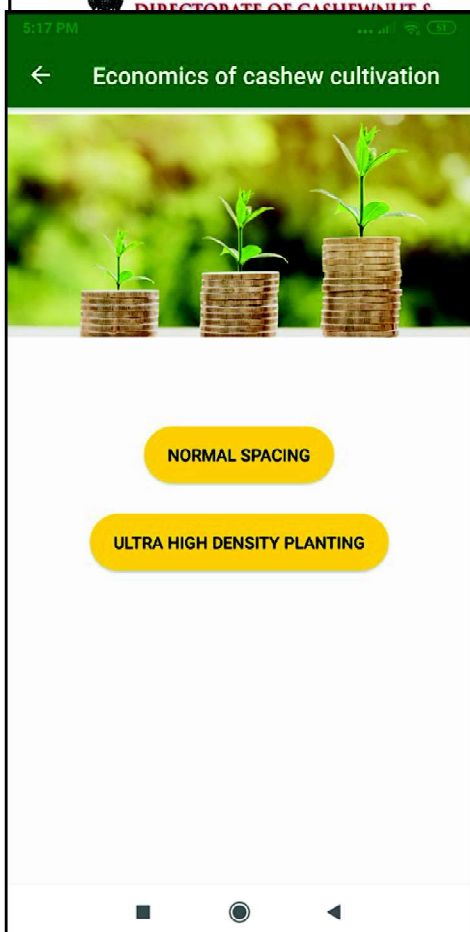
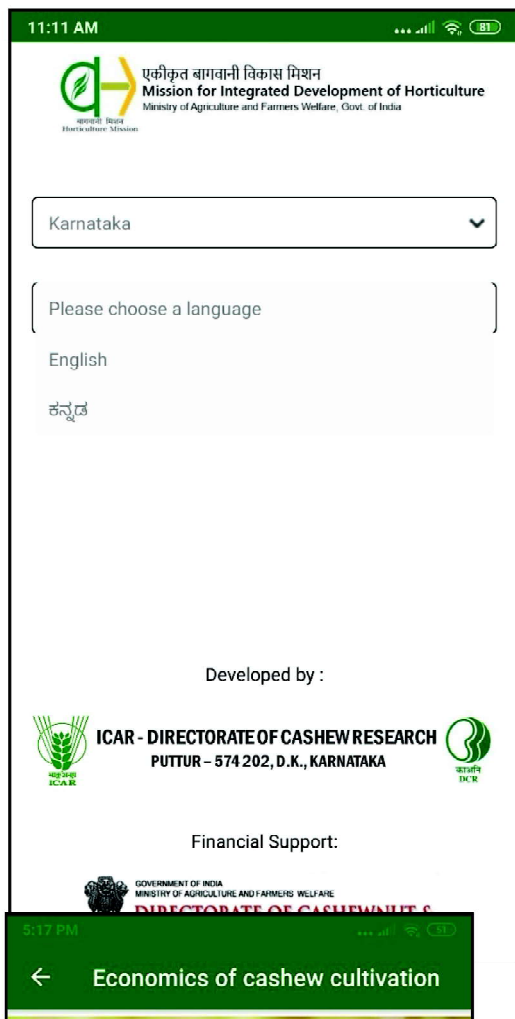
The app is developed for 10 states in India i.e. Gujarat, Maharashtra, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Chhattisgarh, Orissa, West Bengal and Meghalaya, and in 11 languages, i.e. Hindi, English, Gujarati, Marathi, Kannada, Malayalam, Tamil, Telugu, Oria, Garo and Bengali. Each state's content is available in English as well as the local language of the state. The app gives comprehensive and usable information on cashew nurseries, cultivation, plant protection, pollinators, indigenous technical

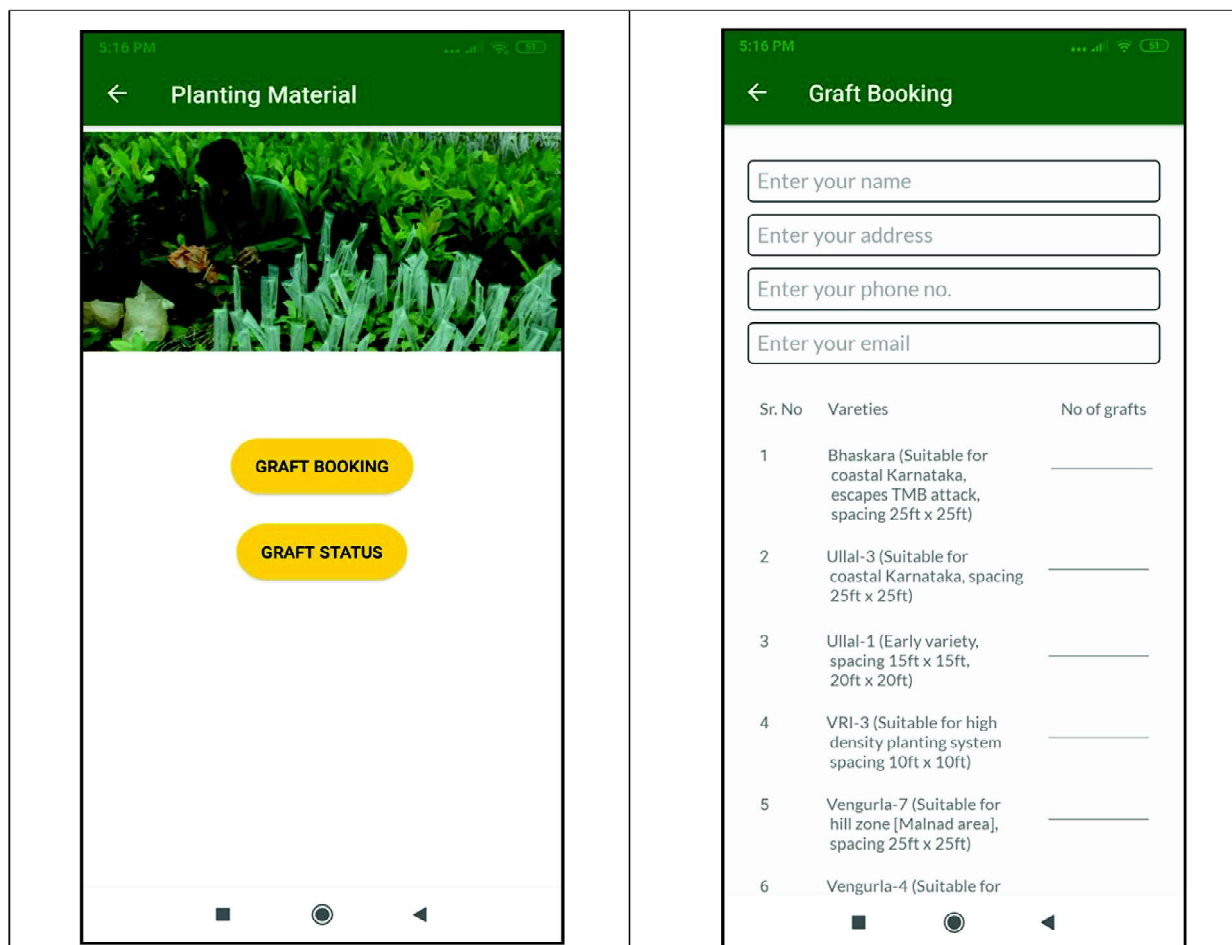


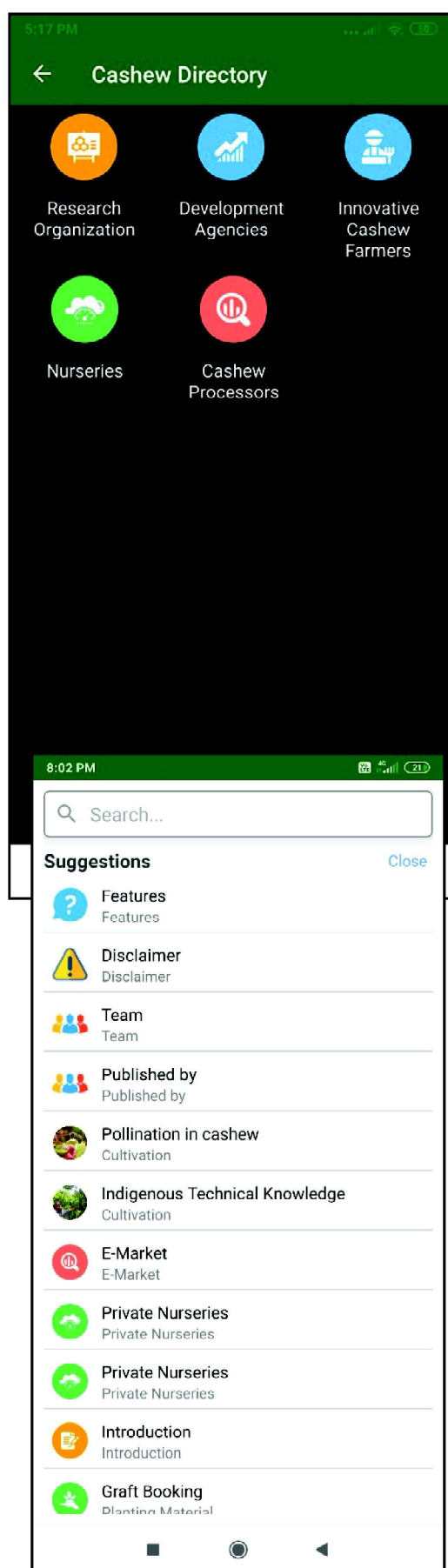
Different modules in Cashew India



Modules in cultivation







knowledge, post-harvest processing, market information, e-marketing, and information on various stakeholders such as farmers, researchers, developmental agencies, and processors in one place.

The app has a unique feature, 'My cashew' wherein a farmer can enter his farm details. This is available in the sub-section of the 'Cultivation' section. Here, the farmer/user can upload and store their cashew images and videos. It is also possible to record the expenditure, observations, and data of the cashew farm.

Provision has been made in the app to order required planting material online from the research stations in a particular state in the 'Planting Material' section. Further, farmers can give their buy/sell requirements in the 'Market Info' section, and they can contact experts through the "Ask Expert" section. Moreover, real-time chatting is possible in the 'Chat Room' with the users. For those who cannot read the text in different sections at once, the e-speak button enables the app to read text.

Feedback

The news about the development of the Cashew India app and its availability in the Google Play Store was published in major English dailies such as The Hindu, Hindu Business Line, Indian Express, and Deccan Herald, in addition to many online platforms. It was also aired through All India Radio. Further, to reach local farmers, it was published in major Kannada (language of the state of Karnataka) dailies such as Vijaya Karnataka, Kannada Prabha, and Udayavani. It was also published in local language newspapers of AICRP centres such as Odia, Tamil, Telugu, Malayalam, Marathi, Bengali, Hindi, etc. It has been shared on social media platforms (Facebook and WhatsApp) and elicited a very good response from the stakeholders regarding its comprehensiveness and user-friendly interface.

The current Google play store rating is 4.12, and the number of downloads is 7840 as of 27-05-2025. The app is used by as many as 27 countries, and some of the important countries include the USA, Brazil, Ghana, Tanzania, Nigeria, UAE, Saudi Arabia, Singapore, and Bangladesh. Using the facility of booking grafts via the app, as many as 33,796 grafts have been booked from farmers of Andhra Pradesh, Karnataka, Maharashtra, Kerala and Tamil Nadu. This exemplifies the importance of the app in

catering to the need of planting material, which is a very crucial aspect in cashew area expansion and cultivation.

The feedback from stakeholders included details such as proper organisation of topics, user-friendly nature, and informative content of the app. Many have felt that it contains all the necessary information for those interested in understanding the whole cashew ecosystem. Some people wanted detailed information on pruning, and accordingly, this has been provided in the app. Others have indicated that regular updating of the app is required, along with current market prices for raw cashew nut. Attempts have been made to replete the app with this information.

Discussion

In the Google play store or any online platform, innumerable apps are available for a given crop. Many organisations are giving certain aspects of a crop in their app or they are combining information of many crops into one app. However, most of the crop-related apps are not comprehensive i.e. varietal information, information on the availability of planting material and online booking facility, cultivation practices, value addition, success stories, market information, a forum for stakeholders to discuss their problems, details of experts, a platform for communication among stakeholders, etc. are not available in these apps. For instance, an app for tomato cultivation gives only information on cultivation aspects. For marketing tomatoes or value addition possibilities, the user has to download different apps! To cite another instance, there are many separate apps on oil palm covering aspects of nutrient requirement, water requirement, site suitability, etc. Further, different language apps related to oil palm are available in Tamil, Telugu, Kannada, and Hindi are available. Instead of installing a separate app every time based on the requirement, if it were to be available in a single app, it would have been more useful. In case of oilseeds also, there are different apps available for sunflower, castor, and their seed production aspects, including biocontrol. This puzzles the user regarding the choice of the app. It is better to combine all aspects of a crop into one app, keeping stakeholders in perspective. However, it is unfortunate to see this trend in most crops, and users are eternally confused while

selecting an app that gives them the requisite and correct information. Sometimes, the users may feel that these apps are developed only for career promotion or other academic benefits, but are not directed toward the cause of stakeholders.

Another evident issue – many app makers do not have an idea of the requirements of stakeholders i.e. information buyers. However, app makers genuinely feel that their app is giving useful information but unfortunately, it is not so, as they have not made efforts to assess the immediate and long-term requirements of stakeholders. They seem to forget the fact that stakeholders have a wide array of real-life requirements. For instance, a farmer wants information on the effective ways of determining the maturity during harvest in arecanut. But the app does not give this specific and practical information, but it has extensive information on the history and taxonomy of the arecanut! Hence, apps reaching true stakeholders are very less in number. In other words, there are too many apps that are out of focus. Further, many crop-related apps appear to be just the mouthpiece of the research institute/organization for announcing their achievements, but seldom care about stakeholders, especially the farmers. In the case of private firms, the apps mostly contain such information that has commercial value. They categorically lack the user perspective but assume and claim its usefulness.

Many apps are often restricted to one language of a particular state, or at most, they are available in two major languages, such as English and Hindi. The information in the required local languages is missing. Even when present, it will most probably be through tools such as Google Translate, which seldom confirm nuances of language in which the information was developed for the first time. However, in some apps, if users need different languages, one has to install different apps. This is again seen as an effort to unnecessarily increase the number of apps! If there is no option to select the required language in an app, then it will be very difficult for stakeholders in different parts of the country to access and understand information.

The app should be comprehensive, i.e., all aspects related to a crop, starting from nursery to marketing as outlined earlier. The app developed by an institute should have the user/stakeholder as the focus instead of the institute.

The app should be simple, innovative, and user-friendly. The information needs to be properly slotted into different modules so as to ease navigation. These are easier said than done! Hence lot of effort in thinking is required to make the app conform to these parameters. In IT parlance, it is often said that ‘content is the king’. This applies very much to crop-related apps. The framework and design of the app, of course, are very important, but under any circumstances, it cannot compensate for the content of the app. The content should be farmer-friendly and has to be presented from the farmer’s perspective and not the usual theoretical aspects.

To the extent possible, the app should be native, i.e. the content should be accessible without the internet once downloaded, as most of the users are in rural areas and internet connectivity is often poor. However, this may be difficult to achieve when the information content in the app is substantial. There is a need to strike a balance between the content and size of the app. The app should be available in the local languages of the target regions, and it should be periodically updated. All the above issues are adequately addressed in the Cashew India app.

Conclusion

A paradigm shift in thinking for the development of crop-related apps has been practically accomplished in ‘Cashew India’. It has overcome the common deficiencies, such as lack of comprehensiveness, out-of-focus nature, and non-availability in local languages that are generally seen in crop-related apps. Given the comprehensiveness and farmer-friendly nature of the Cashew India app, it is strongly advocated that this model can be replicated in different crops. The app can also be referred to for restructuring the existing crop-related apps and making them more farmer-friendly. To achieve the objective of providing useful information to stakeholders, it is also felt that the execution of the concept of “one app per crop from an institute” is very essential. A mere increase in the number of apps will not serve the purpose.

Since the app is available in 11 languages for 10 cashew-growing states, it is possible for all the stakeholders, such as farmers, researchers, students, policy makers, and common people, to access the up-to-date information on various aspects of cashew. This will help in the adoption of the latest technologies in cashew by the farmer.

Further, the app can be used by developmental agencies such as the Directorate of Cashew and Cocoa Development, Kochi, for area expansion and extension activities. It is possible to initiate policy changes regarding the subsidies given to cashew cultivation in different states, permission to produce alcoholic beverages from the cashew apple, etc., based on the information given in the app.

The Cashew India app is maintained and regularly updated by the ICAR- Directorate of Cashew Research, and hence, its continuity is assured.

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References

Cashew India app, 2020. ICAR- Directorate of Cashew Research, Puttur, Karnataka state, India. https://play.google.com/store/apps/details?id=com.cashew.icar&hl=en_IN&gl=US.

CRISP - Rubber Board, 2023, Digital University, Kerala, <https://play.google.com/store/apps/details?id=in.ac.duk.crisp&hl=en>.

Horticultural Crop cultivation, 2019, ICAR- Indian institute of Horticultural Research, Bangalore.

<https://play.google.com/store/apps/details?id=com.FruitsVeg55&hl=en>.

ICAR-IIOR Sunflower, 2024, ICAR- Indian Institute of Oilseeds Research, Rajendranagar, Hyderabad. https://play.google.com/store/apps/details?id=in.org.icar_iior.icar_iior_sunflower&hl=en_IN.

K. Vanitha and T.N. Raviprasad. 2019. Pollinators of cashew, their foraging behaviour, and conservation measures. ICAR - DCR Technical Bulletin No. 30, ICAR-Directorate of Cashew Research, Puttur, Karnataka. 33 p.

Mobile apps on Turmeric, Black pepper, Ginger and cardamom, 2018, Indian Institute of Spices Research, Calicut.

<http://www.spices.res.in/>.

Mung advisor, 2020, ICAR-Indian Institute of Pulses Research (IIPR), Kanpur. <https://mung-advisor.en.aptoide.com/app>.

Nayak, M.G., 2016, Ultra density planting in cashew, ICAR- Directorate of Cashew Research, Puttur, Karnataka. 6 p.

Nayak, M.G., Bhat, P.S. and M.V. Sajeev, 2011, Cashew Production Technology (Revised), DCR Technical Bulletin No. 5., ICAR-Directorate of Cashew Research, Puttur, Karnataka 43 p.

Nayak, M.G., Yadu Kumar, N, Venkatakumar, R. and T.N. Raviprasad, 2004, Indigenous Technical Knowledge in cashew, NRCC Technical Bulletin No. 9, ICAR- Directorate of Cashew Research, Puttur, Karnataka. 20 p.

Oil Palm Crop Doctor, 2019, ICAR-Indian Institute of Oil Palm Research. <https://play.google.com/store/apps/details?id=oilpalm.cropdoctor.iio.pr.iioprdmo&hl=en>.

Onion Crop Advisor, 2023, ICAR- Directorate of Onion and Garlic, Pune, Maharashtra. <https://play.google.com/store/apps/details?id=in.gov.icar.dogr.oqa&hl=en>.

Sally K. Mathew and C.F. Gleena Mary, 2017, Diseases of cashew and their management, The cashew (Eds: P.L. Saroj and KRM Swamy), Indian Council of Agricultural Research, New Delhi, 312 p.