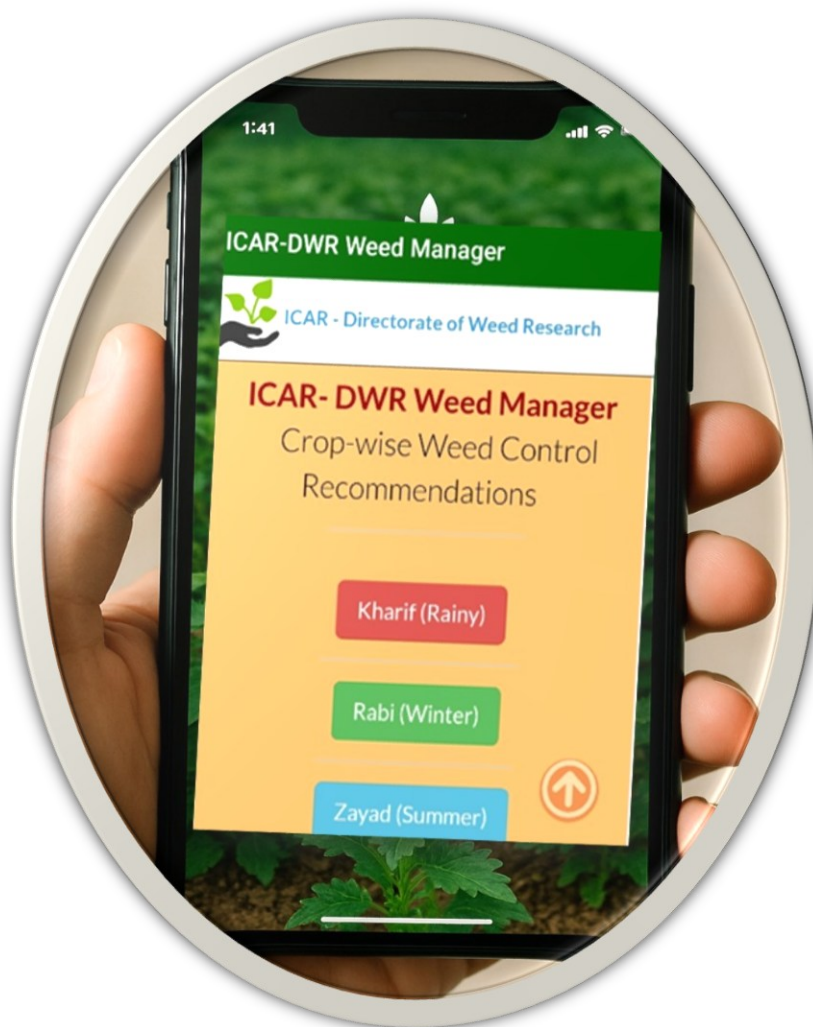


## Weed Manager: A mobile app for weed management



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## Introduction

Weeds are among the most significant constraints to sustainable crop production, causing substantial reductions in yield and quality across diverse agro-ecosystems. Uncontrolled weed growth competes with crops for nutrients, water, light, and space, ultimately diminishing agricultural productivity and profitability. Effective and timely weed management is, therefore, essential for minimizing crop losses and achieving optimal yields. However, in many cases, farmers lack access to accurate, crop-specific information on weed identification and appropriate control measures. This often results in the indiscriminate or incorrect use of herbicides—wrong chemical, incorrect timing, or inappropriate dosage—which not only fails to manage weeds effectively but also incurs unnecessary costs and poses risks to the environment.

To address this critical knowledge gap and enhance the decision-making capacity of stakeholders, the ICAR-Directorate of Weed Research (ICAR-DWR), Jabalpur has developed a mobile application titled “Weed Manager.” This Android-based, user-friendly app serves as a practical tool for farmers, researchers, KVK personnel, agricultural officers, students, and industry professionals. The app allows users to select a crop based on season (*Kharif*, *Rabi*, or *Zaid*), identify the dominant weed flora associated with it, and access scientifically validated recommendations for their control. It provides information on the selection of herbicides and other weed management practices tailored to specific crop–weed scenarios.

The “Weed Manager” app is designed to facilitate timely, precise, and cost-effective weed control, thereby improving crop productivity, conserving natural resources, and reducing reliance on blanket herbicide applications. With its robust backend database, intuitive design, and comprehensive coverage, this app represents a significant advancement in digital agriculture and decision-support tools for integrated weed management.

## Methodology

The ‘Weed Manager’ mobile application has been developed with the objective of providing an accessible, crop-specific, and seasonally relevant weed management tool to diverse agricultural stakeholders. The development methodology comprised the following key steps:

### 1. Data Collection and Compilation

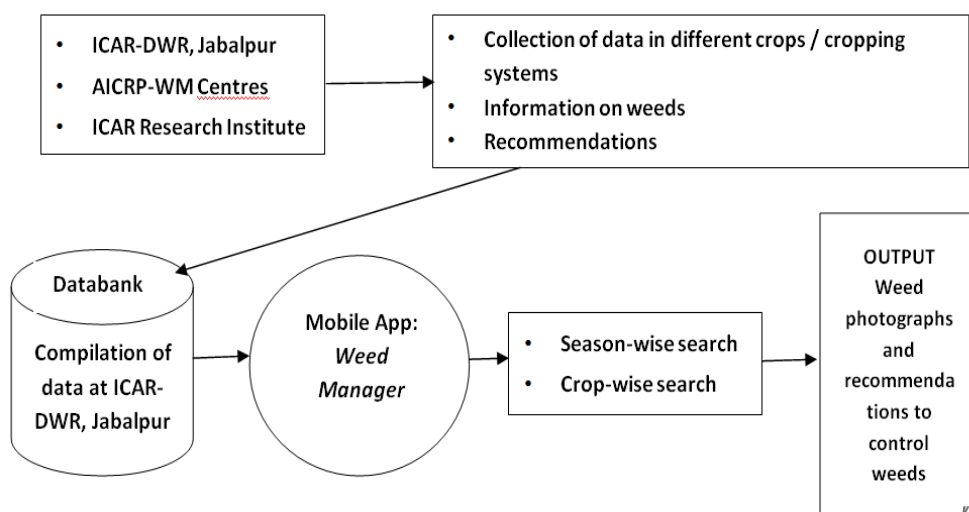
Comprehensive data were compiled from multiple credible sources, including ICAR-DWR’s internal data repository, reports and findings from All India Coordinated Research Project on Weed Management (AICRP-WM) centres and standard agronomic literature and

published weed management recommendations. The data collection focused on the following components:

- Major crops and cropping systems grown across *Kharif*, *Rabi*, and *Zaid* seasons.
- Dominant weed flora associated with each crop and cropping system.
- Availability and suitability of herbicides in the Indian market.
- Crop-wise, season-wise and region-specific recommendations for chemical and non-chemical weed management practices.

## 2. App Design and Development

The mobile application was designed as a menu-driven, Android-compatible platform to ensure easy usability and widespread access. Key features of the design include season-wise categorization (*Kharif*, *Rabi*, *Zaid*) for user convenience, crop selection interface following season selection, display of dominant weed species commonly found in selected crops, instant access to recommended weed management practices, including herbicide names, dosage, application time, and method. The app was programmed using standard Android development tools to ensure compatibility with widely used smartphones. A responsive interface was designed for minimal user input, enabling rapid access to information with just a few taps.



### Passport data

## 3. Validation and Feedback Mechanism

To ensure relevance, accuracy, and user satisfaction a user feedback survey was conducted using a pre-tested questionnaire; the questionnaire evaluated general usability, information accuracy, satisfaction level, ease of navigation, and suggestions for improvement;

Out of all users who downloaded the app, 156 responses were received and analyzed and feedback was incorporated to improve app functionality, user interface, and content precision.

#### **4. Deployment and Accessibility**

The final application was uploaded to the Google Play Store, making it freely available for Android users. The app requires basic internet connectivity for data retrieval and functionality. Awareness and outreach activities were conducted through training programs, workshops, and demonstrations to promote adoption among stakeholders.

### **Results**

The “Weed Manager” mobile application was developed to empower farmers and agricultural stakeholders with easy access to scientifically validated weed management practices. Upon deployment and subsequent evaluation, the app has demonstrated significant benefits in terms of usability, efficiency, knowledge dissemination, and crop yield enhancement.

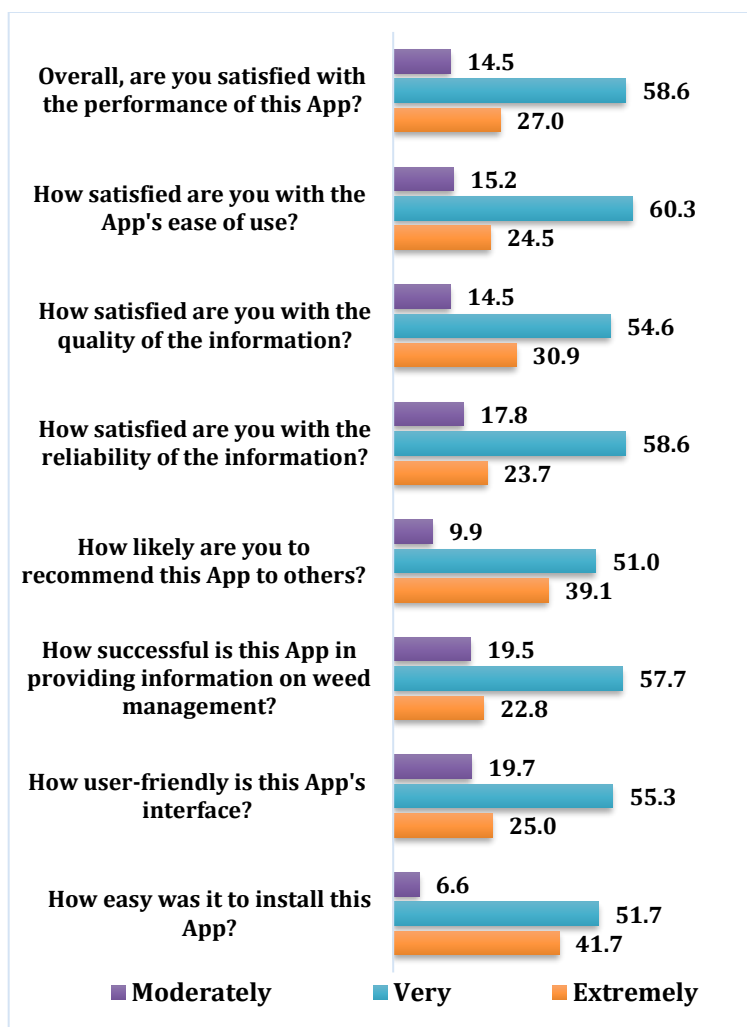
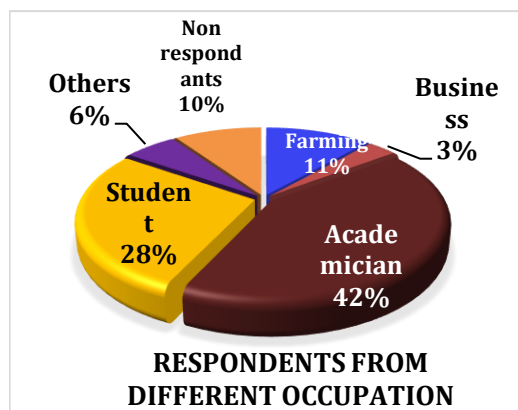
#### **1. User Response and Feedback**

To assess the app’s functionality, relevance, and user satisfaction, a detailed validation study was conducted. A pre-tested questionnaire was shared with all users who downloaded and used the tool. A total of 156 completed responses were received and analyzed.

| Parameter Evaluated                             | % Positive Response |
|-------------------------------------------------|---------------------|
| Ease of navigation and interface                | 93%                 |
| Accuracy of weed identification and information | 89%                 |
| Usefulness of herbicide recommendations         | 91%                 |
| Timeliness and practical utility of advice      | 88%                 |
| Overall user satisfaction                       | 94%                 |
| Likelihood of recommending the app to others    | 90%                 |

#### **2. Agronomic Impact**

Based on user reports and field feedback adoption of appropriate weed management practices recommended through the app resulted in crop yield enhancement of 15–20%. The app facilitated the timely application of herbicides at the correct dose and stage, thereby improving weed control efficiency.



**Respondents' opinion**

### 3. Resource Efficiency

The app significantly contributed to saving of labour, time, and energy by reducing unnecessary weeding operations and herbicide misuse; enhanced water-use efficiency, especially in irrigated crops, by preventing excessive weed transpiration losses and better conservation of soil nutrients through timely suppression of nutrient-depleting weeds.

### 4. Cost-Effectiveness

Economic analysis indicated a notable reduction in weed management costs due to precise herbicide selection and dosage and increased benefit-cost (BC) ratio as a result of improved yields and lower weed management expenses.

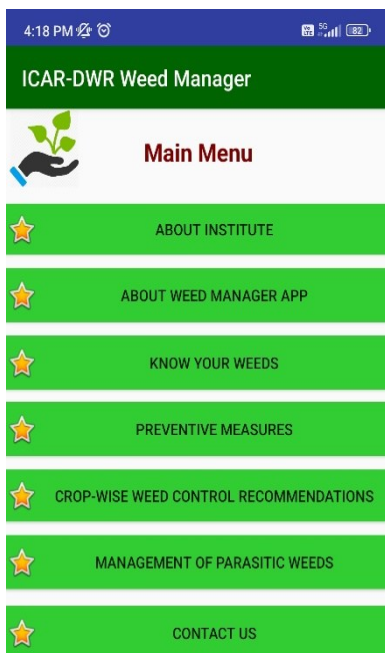
### 5. Capacity Building and Outreach

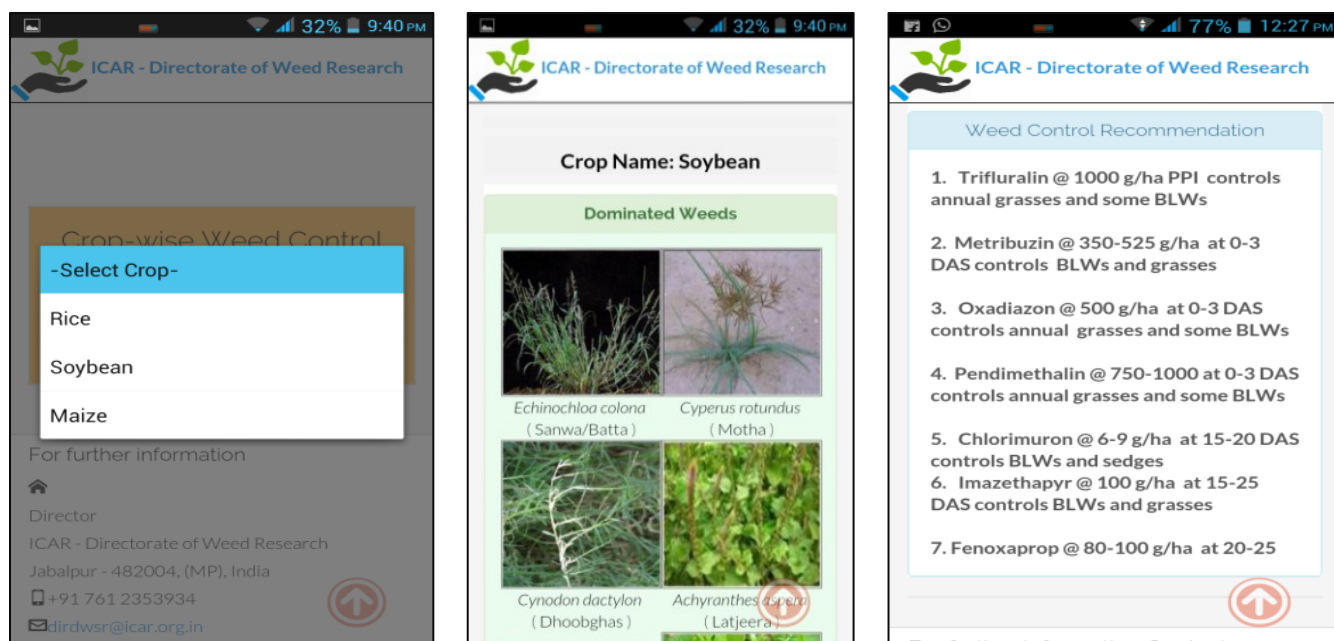
The app has been effectively used by a diverse group of stakeholders, including farmers, researchers, extension personnel (KVKs), students, and agricultural officers. The application has

improved users' capacity to make informed decisions regarding weed control and herbicide usage.



Icon of Weed Manager Mobile Application





**Fig.** Step-by step data flow



**Fig.** Number of downloads by the different stakeholders

## Benefits

The “Weed Manager” mobile app, developed by ICAR-Directorate of Weed Research, Jabalpur, offers timely and accurate weed management solutions for farmers and agricultural stakeholders. By guiding users on the right herbicide, dose, and application time, the app helps reduce crop-weed competition, leading to a 15–20% increase in crop yields. It promotes efficient resource use by saving time, labour, and input costs, while improving the benefit-cost ratio. The app also aids in soil and nutrient conservation and enhances decision-making across seasons and crops. With its user-friendly interface and wide accessibility, it serves a diverse group of users and has strong potential for commercial and extension use. Its uniqueness lies in being India’s first crop-wise weed identification and management app, backed by a comprehensive, curated database, making it a key tool for precision agriculture.

## Upscaling

The “Weed Manager” mobile app, has strong potential to revolutionize weed management in Indian agriculture by improving crop yields (15–20%), reducing input costs, conserving resources, and enhancing decision-making. At present the android application has been downloaded by 13,700 stakeholders belonging to various categories. To upscale its use, focused efforts are being carried out in awareness creation through KVKs and extension agencies, technological upgrades (regional languages, offline mode, AI-based weed identification), and integration with platforms like AgriStack and eNAM. Strategic public-private partnerships and inclusion in national schemes (NFSM, RKVY, PKVY) can further drive adoption.

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### For more information contact

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