Web and Mobile Apps for Fruit Disease Detection: A Survey

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***Abstract*—With the increasing global reliance on agriculture and the need for timely intervention in managing plant diseases, web and mobile applications have emerged as crucial tools for farmers, especially in fruit cultivation. This paper surveys prominent mobile and web-based platforms that utilize artificial intelligence (AI) and machine learning (ML) to detect plant diseases through image analysis. Focusing on usability for farmers with limited digital literacy, the study evaluates apps based on detection accuracy, user interface simplicity, language support, integration with agricultural databases or extension services, and digital reach. Notable platforms such as Plantix, Tumaini, PlantVillage Nuru, Agrix Tech, MyIPM, and Save Our Citrus are profiled in detail. These apps vary in their scope, technology, and regional focus, but collectively represent a growing trend in AI-powered agricultural support systems. A comparative analysis highlights their strengths and limitations, emphasizing the importance of localization, offline capabilities, and expert integration. This survey aims to inform researchers, developers, and policymakers about the current landscape of digital plant health tools, paving the way for more inclusive and effective solutions in smart agriculture.**

***Keywords*—Plant disease detection, Artificial intelligence (AI), Machine learning (ML), Image analysis, Mobile applications, Web applications, Smart agriculture, Digital agriculture, Farmer support tools, Plant health monitoring, Agricultural technology, Usability, Digital literacy, Detection accuracy, Language support, Agricultural databases.**

I. INTRODUCTION

Smartphone and web-based tools are increasingly used to help farmers identify crop diseases and get treatment advice. Many new apps leverage artificial intelligence (AI) to diagnose plant ailments from photos. This survey reviews major platforms aimed at fruit growers (as well as general crop health apps with fruit modules) and compares them on key criteria: detection accuracy (AI/ML performance), ease of use for low-digital-literacy farmers, language support (especially local languages), integration with agricultural databases or extension services, and their digital/social reach (downloads, users, etc.). We include both global products (e.g. Plantix, PlantVillage) and regional apps (e.g. Tumaini for bananas, local African startups). Each app is profiled in detail, with metrics summarized in a table. A final comparative analysis highlights how these tools differ in usability and reach.

II. METHODOLOGY

We identified relevant platforms via academic and media searches for "plant/fruit disease diagnosis app" and screened for those accessible to farmers. For each app, we collected data from official sites, published articles, and news releases. Platforms were evaluated on:

- Detection accuracy: Performance of the AI/ML model (typically measured in success rate or accuracy) in correctly identifying diseases.
- UI simplicity and usability: How easy the app or site is to use for farmers (e.g. step-by-step workflows, offline use, voice guidance).
- Language support: Availability of instructions and output in local or regional languages (especially non-English).
- Integration: Links with local agricultural knowledge or data (e.g. extension services, open knowledge bases, government databases).
- Digital reach: Publicly available metrics such as download counts, active users, or reported usage statistics.

Data sources include project blogs, press releases, app stores, and news coverage (see citations).

App Profiles

Plantix (Germany)

Plantix is a widely used crop-diagnosis app developed in Berlin. Farmers take a photo of an affected plant, and Plantix's deep-learning model instantly identifies potential diseases or pests and suggests treatments. It covers hundreds of crops (including many fruits like strawberry, grape, apple, and citrus) and claims high accuracy in classification. In practice, Plantix diagnoses 780+ diseases across 82 crops (fruits, vegetables, grains) and offers a treatment library. A user survey testimonial notes that the "app is efficient and user-friendly, making it a breeze to identify crop diseases". The UI is simple: take/upload a photo, wait a few seconds for results, then browse treatment options or community Q&A. Plantix requires only occasional internet, though its AI runs on-device.

Plantix has multilingual support: 18 languages globally, enabling use in many regions (e.g. Hindi, Spanish, Chinese, Swahili, Portuguese). It connects with an agri-retailer network for ordering inputs. The platform also maintains an online knowledge library (the largest open-access crop health database) and B2B dashboards for aggregated crop data. Plantix's social reach is extensive – it has answered 50–100+ million crop-health queries from farmers. It boasts ~134,000 daily active users and is available in 177 countries and 18 languages.

Metric	Plantix
Detection accuracy	Very high (CNN-based classification of ~780 diseases) (no single % given)
UI simplicity	Photo-based diagnosis in a few taps; user-friendly interface
Language support	18 languages globally (English, Hindi, Chinese, Spanish, Swahili, etc.)
Integration	Integrates AI + expert community Q&A; links to agri-retailers; uses PlantVillage library
Digital reach	~134k daily users; 50M+ Qs answered/yr; 100M+ Qs total

Tumaini (CIAT)

Tumaini is a research-driven mobile app (by CIAT/USAID) focused on banana and bean diseases. It uses on-device AI to analyze photos of banana plant parts (leaves, fruit, bunches). The banana version identifies 7 major diseases (e.g. Fusarium wilt, Sigatoka) and the banana weevil pest, while a new "TumainiBeans" covers 5 common bean diseases. The interface guides the user through scanning different plant parts step-by-step, then returns an immediate diagnosis and treatment advice. Notably, Tumaini can work offline (no internet needed) after an initial download, and it can even process low-quality images with background noise.

Reported model accuracy is strong: continental models yield 70–99% success rates depending on disease and plant part. For example, bean diseases are detected at 90% accuracy. Tumaini also supports English, Spanish, French, Tamil, and Swahili, allowing outreach to smallholders in Africa and Asia. The app feeds data into an online dashboard (tumainiaiapp.org) for real-time disease mapping and research. Its early deployment (2019-2024) has led to global adaptation: as of 2024 it has ~14,000 Android downloads with iOS just launched, and active users in countries like India, Ecuador, Colombia (each ~1,000+/month).

Metric	Tumaini (Bananas/Beans)
Detection accuracy	70–99% (varies by crop/disease); beans ~90%
UI simplicity	Guided photo scans of plant parts (step-by-step); works offline
Language support	English, Spanish, French, Tamil, Swahili (multi-regional)
Integration	Data integrated into CIAT dashboard; geo-mapping of outbreaks
Digital reach	~14k Android downloads; 1k+ monthly active in India/LatAm

PlantVillage Nuru (Penn State)

PlantVillage's Nuru app (developed by Penn State & FAO) targets staple and fruit crops in Africa (cassava, maize, beans, etc.). Farmers use an Android phone to photograph a suspect plant and Nuru's AI model diagnoses diseases (e.g. cassava mosaic, maize blight) instantly. The system was "recognized by Google" and praised for its "high degree of accuracy" comparable to experts. It runs fully offline (no network needed) and even implements a voice-based digital assistant to guide users.

Nuru is designed for ease of use: it pairs computer vision with a simple chat interface. It provides the diagnosis plus management advice (e.g. resistant

varieties, treatments). Importantly, local languages are built-in: Nuru will speak Swahili, French, English and Twi (for Ghana) and plans to add more continuously. This multilingual support is critical for adoption by smallholders. The app is a public good (no ads or data-selling), integrated with the PlantVillage open library of crop health knowledge. Its adoption has been growing: as of 2018 it had ~10,000 Google Play installs (primarily in Africa) and continues to be expanded by FAO projects.

Metric	PlantVillage Nuru
Detection accuracy	High (CNNs trained on expert-curated dataset) (no % given)
UI simplicity	Offline photo-based diagnosis; digital assistant chatbot UI
Language support	English, French, Swahili, Twi (and expanding)
Integration	Integrates AI with Penn State/FAO extension resources; uses PlantVillage library
Digital reach	~10K+ downloads on Play Store (mostly Africa)

Agrix Tech (Cameroon)

Agrix Tech is a Cameroon-based startup focusing on smallholder needs. Its app targets key vegetable and fruit crops (tomato, grape, potato, etc.) and runs fully offline on Android. The farmer simply scans an unhealthy plant leaf or fruit, and the app's AI model (trained on local pest/disease images) gives a diagnosis with treatment suggestions. Notably, diagnostics are delivered in text and voice to assist semi-literate users. Agrix Tech's co-founder notes the system "was made to diagnose plant diseases and suggest appropriate treatments" and is especially effective on early blight in tomatoes.

The app's UI is straightforward: a video/photo capture of the leaf automatically triggers analysis, then the farmer hears or reads the result. It also includes farming tips (e.g. seeding, growing reminders) via SMS outreach. Language support is a major feature: users can choose English or French (standard or West African pidgin) and even a language like Hausa. This local-language focus increases accessibility. Agrix Tech reports over 5,000 active users in Cameroon after pilot launch. (It is grant-funded and seeking investment to scale.) Currently, integration is mainly with local extension programs (they also share SMS advisories from agricultural technicians).

Metric	Agrix Tech (Cameroon)
Detection accuracy	Focused on local diseases (e.g. early blight) – accuracy not formally published, but reported as "effective" on tomatoes
UI simplicity	Photo/video input; diagnosis via voice/text; SMS tips; offline usage
Language support	English, French (including pidgin), Hausa (local African languages)
Integration	Linked with local extension (SMS advisories); offline use; sells Ad space to agri-firms
Digital reach	~5,000 active users (all in Cameroon) (early stage)

MyIPM (University of Georgia, USA)

MyIPM is a free mobile/web tool for fruit growers in the eastern United States (apples, peaches, cherries, blueberries, etc.). Developed by UGA and Clemson extension, it does not use AI; instead it combines decision trees of symptoms, photos, and expert rules. A farmer selects the crop and describes symptoms (using images and text menus), and the app narrows down likely diseases or pests. It includes 9 fruit crops (with both disease and insect tools). MyIPM emphasizes information: detailed images of symptoms, lists of approved treatments, and management tips.

The UI is very simple and doesn't require image capture – it's essentially a guided Q&A/information app. The homepage notes "a series of descriptions, audio and images" are used to help diagnose. It's bilingual (English only at present), and runs on both iOS and Android. As a university extension product, it integrates the latest research and extension recommendations. Usage is modest: by 2019 MyIPM had been downloaded just ~2,100 times, serving a niche of commercial growers. Surveys indicate 65% of users said it helped them manage pests and 70% reported increased knowledge of integrated pest management.

Metric	MyIPM (UGA, USA)
Detection accuracy	Rule-based (expert Q&A); not AI; accuracy depends on user inputs
UI simplicity	Guided symptom-question workflow (descriptions + images); easy for literate users
Language support	English only (regional US focus)
Integration	Direct integration with Extension knowledge (UGA, Clemson); regularly updated by land-grant specialists
Digital	~2,100 total downloads; positive

reach	extension survey feedback

Save Our Citrus (USDA, USA)

The USDA's Save Our Citrus app (2012) was an early example of a farmer tool for citrus diseases in the US. It is a free iPhone app designed to quickly identify four major citrus diseases (Huanglongbing, canker, black spot, scab) that threaten Florida and other regions. The UI walks users through a few questions, then allows a photo upload. Rather than AI, it channels reports: once the user uploads an image or symptoms, the app sends it to experts for a response. It replies with an individual diagnostic answer. The process is simple (several taps and a photo) and outputs expert advice on next steps.

Save Our Citrus was bilingual (English/Spanish) to reach home and commercial growers. It explicitly integrated with USDA/APHIS: data and reports contributed to national disease monitoring. It does not publish usage statistics, but it was promoted in extension channels. (The app's development was part of USDA's strategy to engage backyard growers as a "first line of defense" against pathogens.)

Metric	Save Our Citrus (USDA)
Detection accuracy	Symptom questionnaire + photo; accuracy depends on expert review (not ML)
UI simplicity	User answers questions and uploads photo in a few steps
Language support	English and Spanish
Integration	Linked to USDA/APHIS extension and reporting networks; alerts experts with photo data
Digital reach	(Not publicly reported) — free for U.S. citrus growers since 2012

Mnzeru Mkupangwa (Malawi)

Mnzeru Mkupangwa is a new Malawian app (2024) built for local smallholders. It uses AI to detect diseases on key crops including maize, tomato, blueberry, pepper, apple. A farmer simply takes or uploads a photo and the app "quickly identifies the issue, displaying the disease name". The interface also features an AI chatbot that answers general farming questions. Crucially, it supports local languages: it speaks Chichewa and English natively, making it accessible across Malawi's regions.

Mnzeru Mkupangwa emphasizes on-site diagnosis. The UI is modern: photo input plus chat dialog. After identification, it provides written advice on control measures. The developers stress that the app fills a gap in Malawian agriculture, reducing up to 40% crop losses by real-time ID. As of late 2024, it had received positive farmer feedback (no download count given). This app is still early-stage but noteworthy for its focus on fruits and local languages.

Metric	Mnzeru Mkupangwa (Malawi)
Detection accuracy	AI classifier trained on local crops; reported as "real-time disease identification" (no % given)
UI simplicity	Photo-based; plus an AI chatbot for advice; offline-capable design implied
Language support	Chichewa and English interface
Integration	Not specified (focus on AI/chatbot platform)
Digital reach	(Just launched) – app "already [gets] positive feedback" from farmers

Comparative Analysis

The surveyed tools differ significantly in design and reach. Plantix is a mature global solution: its deep AI covers hundreds of crops (including fruits) with real-time photo diagnosis and rich expert advice. Its key strengths are high user adoption and broad language coverage – it's available in 18 languages and serving ~134k daily users. Its UI is streamlined for farmers (photo → diagnosis in seconds) and it includes an integrated library of crop knowledge. By contrast, Nuru and Tumaini target specific crops and regions. Tumaini excels at bananas/beans with offline use and strong models (70–99% accuracy), and it supports local languages like Swahili and Tamil. Nuru focuses on African staples (cassava, maize) and plans to support Swahili, Twi, etc. with voice guidance. Both are research-led and freely available to farmers.

Among regional apps, Agrix Tech and Mnzeru Mkupangwa emphasize local adaptation: they run entirely offline on inexpensive phones and speak local languages (Hausa, pidgin, Chichewa). They pair image diagnosis with text/voice output, recognizing the low literacy of target users. However, these are young projects with modest user bases (a few thousand in Cameroon and Malawi) and limited crop lists. MyIPM (USA) and Save Our Citrus show another approach: they are deterministic expert systems (not AI) linking farmers to extension knowledge. They lack multi-

language AI, but they are authoritative and easy to use for their audience. MyIPM has the advantage of being integrated with extension universities, while Save Our Citrus is directly tied to USDA monitoring programs.

In terms of UI and usability, most AI apps simply require taking a photo – a natural workflow for farmers. Tumaini and Nuru operate offline (crucial where networks are poor). Agrix adds voice output to help semi-literate users. MyIPM's questionnaire approach is intuitive for English-speaking growers, but less flexible. Language support is a key differentiator: Plantix (18 languages) and the USDA app (English/Spanish) cover many regions, while African apps incorporate local dialects.

Integration with local data varies: MyIPM and Save Our Citrus tightly integrate university/government recommendations, PlantVillage and Tumaini feed into CGIAR and FAO networks, and Plantix builds a commercial retailer ecosystem. Social reach is highest for Plantix (tens of millions of Qs). Tumaini and PlantVillage are growing but smaller-scale (thousands of downloads). The new Malawi app has no published usage yet but aims to scale.

III. DISCUSSION

These platforms illustrate trade-offs. Global apps like Plantix offer broad coverage and polish but may miss rare local diseases; they rely on users having smartphones and some digital literacy. Local AI apps (Tumaini, Agrix) deeply model endemic diseases and tailor language, but need sustained investment to reach users. Farmer accessibility is enhanced by *offline capability*, *voice/text output*, and *local languages* – all features stressed by successful projects. Integration with extension systems ensures advice is trusted: e.g. Save Our Citrus channels expert feedback,and MyIPM updates come from land-grant specialists.

One challenge is validating accuracy in field conditions. Tumaini reports high success rates in trials, and PlantVillage was shown "TensorFlow models… with a high degree of accuracy". However, real-world performance can vary by camera quality and disease stage. Multi-symptom apps (Plantix's 780 diseases) may sacrifice depth on any one crop, while narrow apps (Tumaini's 5–7 diseases) can optimize for high precision on a few. Farmers also value quick, clear instructions: most reviewed tools present not only a diagnosis but actionable treatment steps.

Digital reach remains a barrier. Plantix's tens of millions of interactions dwarf the few thousand users of newer apps. Without strong distribution (via extension agents or NGOs), cutting-edge apps may struggle to attain scale. Conversely, the reliance on familiar extension formats (like Save Our Citrus) can limit innovation.

IV. CONCLUSION

Web and mobile apps for fruit disease management show great promise but diverse approaches. AI-powered diagnostic apps like Plantix, Tumaini, Nuru, and Malawi's new tool harness image recognition to offer near-instant guidance, often offline and in farmers' own languages. Extension-driven apps (MyIPM, Save Our Citrus) trade off AI for curated expertise and simplicity. Successful platforms blend accuracy with usability: they work on low-end phones, use clear visuals or voice, and integrate local agronomic knowledge. In practice, no single app leads on all metrics; each has trade-offs (Table above). Overall, Plantix stands out for reach and multilingual support, Tumaini/Nuru for crop-specific accuracy and offline use, and local innovators (Agrix, Malawi) for deep regional adaptation. Future work should measure on-farm accuracy and user adoption in each target community. The continued push to support underserved languages and integrate with local farming systems will be key to delivering these tools to those who need them most.

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