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SAFE GUARD USE OF ORGANIC FOOD TRACEABILITY SYSTEM AWS S3

Prajaktha P Gaikwad[1], Bhavya Shree H M[2]

PG Student, The National Institute of Engineering, Mysuru, India[1]

Faculty, The National Institute of Engineering, Mysuru, Visveswaraya Technological University, Belagavi, Karnataka, India[2]

Abstract: The Organic Food Traceability System addresses key challenges in the organic food supply chain, such as labelling inaccuracies, certification fraud, and lack of transparency, by leveraging JSON files and AWS S3. The system securely records and stores transaction and certification data, ensuring data authenticity, privacy, and tamper resistance while overcoming issues of centralized control and information silos found in traditional traceability systems. By providing transparent access to food origin and certification details, the solution enhances trust among consumers and stakeholders. Experimental results demonstrate improved efficiency, reliable data integrity, secure handling of sensitive information, and practical applicability, establishing a robust and trustworthy framework for organic food supply chain management.

Keywords: Organic Product, certification fraud, labelling inaccuracies, JSON File, AWS S3.

I. INTRODUCTION

India's extensive agricultural terrain, favourable climate, and abundant biodiversity provide significant advantages for the production of fruits and vegetables. According to data from the Indian Ministry of Agriculture and Farmers' Welfare, a substantial portion of the country's agricultural output—306.82 million tons in 2019—was attributed to fruits and vegetables. These agricultural products are valued for their nutritional content, freshness, and role in promoting a healthy lifestyle, making them highly popular among consumers across the nation. However, the perishable nature of fruits and vegetables, combined with their specific storage requirements, poses challenges. To maintain their quality and safety, they must be stored at low temperatures. Failure to meet these storage requirements can lead to food safety issues, jeopardizing consumer health and disrupting the supply chain. To mitigate these risks and ensure the future prosperity of India's agricultural sector, it is essential to improve storage facilities and adopt effective preservation methods. Investments in advanced storage technologies, implementation of cutting-edge preservation techniques, and promotion of proper handling practices can enable India to better utilize its agricultural resources. This will ensure a consistent supply of safe and nutritious produce for its population while enhancing the country's reputation in international markets. As India navigates the complexities of its agricultural sector, there is a growing recognition of the importance of investing in traceability infrastructure. This investment is crucial not only for protecting public health but also for boosting consumer confidence, facilitating trade, and fostering sustainable agricultural practices. Consequently, both public and private sector organizations are collaborating to foster a culture of accountability and traceability within India's agricultural industry.

II. SCOPE OF THE LITERATURE SURVEY

Existing studies clearly demonstrate that block chain technology can improve food safety, transparency, and traceability within supply chains. However, a critical gap remains in the practical application of block chain for organic food traceability. Most reviewed works focus on general food supply chains rather than addressing organic food–specific challenges such as certification verification, labelling fraud, and consumer trust. Additionally, many proposed block chain-based solutions are conceptual or literature-driven, lacking real-world implementation models that support real-time data handling and end-to-end tracking. Even implementation-focused systems rely heavily on costly infrastructure, complex technologies (IoT, AI, smart contracts), and continuous connectivity, making them unsuitable for small-scale farmers and low-resource environments. Furthermore, current solutions often suffer from scalability issues, high operational costs, technical complexity, and limited stakeholder participation. As a result, there is a lack of a lightweight, affordable, and user-friendly traceability system that ensures data security, prevents certification fraud, and provides transparent access to organic food information for consumers.

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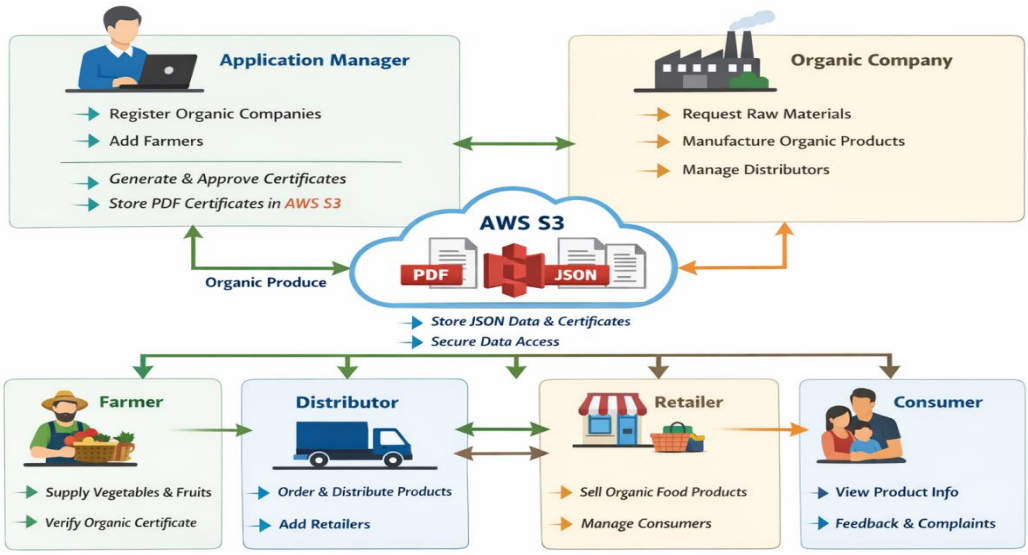
III. PROPOSED WORK

The proposed Organic Food Traceability System is a comprehensive solution designed to address critical challenges in the organic food supply chain, such as labelling inaccuracies, certification fraud, and lack of transparency. By integrating JSON file with robust cloud storage, the system ensures secure, transparent, and reliable management of food traceability data. The proposed system directly addresses the pain points in the organic food supply chain, ensuring transparency, security, and trust. By leveraging JSON file and AWS S3, the system secures sensitive data while setting new standards for efficiency and transparency in supply chain management. This innovative approach has the potential to transform the organic food industry, providing stakeholders with the tools needed.

IV. METHODOLOGY

The proposed Organic Food Traceability System follows a role-based, multi-stakeholder methodology to ensure secure, transparent, and end-to-end tracking of organic food products from farm to consumer. The Application Manager initiates the process by managing system access, registering organic manufacturing companies and farmers, and issuing digital organic certificates in PDF format, which are securely stored in AWS S3. Each certificate is generated based on verified organic practices and crop details, ensuring authenticity and non-repudiation. Organic companies interact with certified farmers by posting raw material requirements, verifying farmer certificates, recording procurement details, and manufacturing organic food products. Each manufactured product is uniquely identified using a series number and recorded in structured JSON format containing manufacturing, expiry, quantity, and pricing information, which is securely uploaded to AWS S3. Distributors and retailers are on boarded through code-based credential generation and SMTP email authentication, enabling controlled access and accountability. Product movement, order approvals, stock updates, and sales transactions are continuously logged as JSON records in AWS S3, ensuring tamper resistance and traceability. Consumers can verify complete product flow details using the product series number and submit feedback or complaints, further enhancing transparency and trust. Overall, the methodology integrates secure authentication, certificate digitization, JSON-based transaction logging, and cloud-based storage to deliver a scalable, reliable, and transparent organic food supply chain management system.



V. RESULT ANALYSIS

The implementation of the proposed Organic Food Supply Chain Management System demonstrates significant improvements in transparency, traceability, and efficiency across the entire organic food ecosystem. Results obtained from system execution and module-wise evaluation indicate that safety objectives certification, end-to-end product tracking and stakeholder accountability are effectively achieved. The digital certification process turned out to be super-efficient. Now, organic product and farmer certificates are made as PDFs and stored right on AWS S3, so everything's easy to find and safe. No more waiting around for approvals like before—what used to drag on with manual checks now moves fast, and you don't have to worry about losing or duplicating certificates. They also added a serial number system for tracking products, which means you can trace every batch from start to finish. All the production, shipping, retail, and sales info gets saved in JSON files. Whenever the product changes hands—whether it's the company, distributor, or

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retailer—the system updates in real time. So, you always know what's in stock and every transaction is locked in, making it hard to mess with the records. This really tightened up inventory management. Fewer mistakes, less confusion about what's in stock. Farmers and customers both feel better about it. Farmers get a clear, transparent record of everything they've supplied, and customers can check exactly where their food came from just by using the serial number. You don't have to just trust the label; you can see the whole journey from farm to shelf. That kind of visibility cuts down on fake organic products and helps build real trust. On the business side, automating stuff and setting up workflows based on each person's role seriously cut down on paperwork and admin headaches. Credentials get sent out automatically through SMTP, approvals happen faster, and everyone has one place to access data. Working together is easier, and there are way fewer mistakes. Feedback and complaint modules further enhanced product quality monitoring and accountability. In terms of performance and reliability, cloud-based storage ensured high availability and scalability, even with increasing numbers of users, certificates, and transactions. Secure access control and audit logs supported compliance with regulatory requirements. Overall, the result analysis confirms that the proposed system successfully meets its intended goals by delivering a secure, transparent, efficient, and trustworthy organic food supply chain, benefiting farmers, companies, distributors, retailers, regulators, and consumers alike.

VI. CONCLUSION

The proposed Organic Food Supply Chain Management System successfully addresses the critical challenges of authenticity, transparency, and traceability in the organic food industry. By digitizing organic certification, product manufacturing, and supply chain transactions, the system eliminates reliance on manual processes and significantly reduces the risk of fraud, data manipulation, and certificate duplication. The integration of PDF-based certificates, Series Number–driven JSON tracking, and secure cloud storage using AWS S3 ensures reliable data integrity and long-term availability. The role-based architecture enables efficient coordination among application managers, organic companies, farmers, distributors, retailers, and consumers, while automated workflows enhance operational efficiency and accountability. Farmers gain fair recognition for genuine organic practices, companies benefit from improved inventory and compliance management, and consumers gain confidence through complete farm-to-fork product visibility. Overall, the system establishes a trusted, scalable, and secure digital ecosystem for organic food supply chain management, promoting ethical practices, strengthening regulatory compliance, and enhancing consumer trust in organic products.

VII. SNAPSHOTS

1. Home Page

Serves as the central dashboard offering easy navigation to all major sections of the web app. It provides a clear and user-friendly layout.

Home Page-1

Home Page-2

2. Login Page

Provides a secure authentication system to ensure only authorized users can access application. It acts as the entry point to the platform's features.

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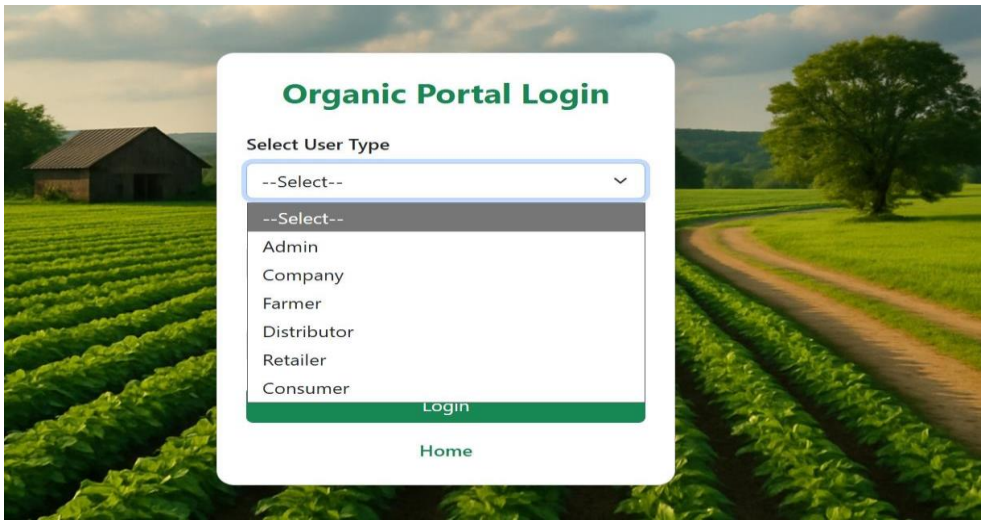
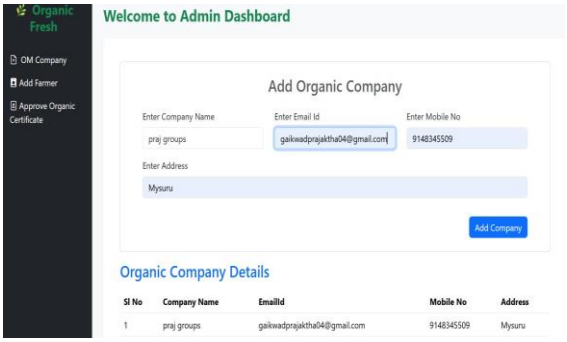


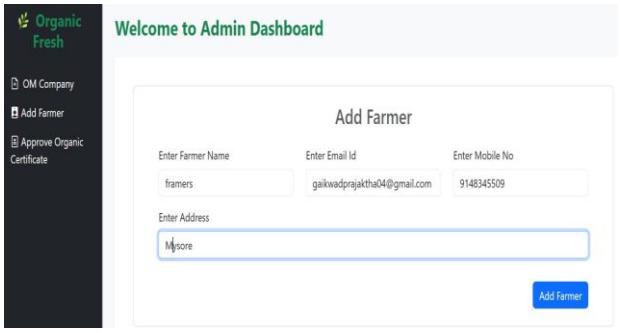
Login Page

3. Admin Page

In this page we need to add the particular company name which is organic manufacture company, and need to add the farmer.



Admin Page-1



Admin Page-2

Admin Page-3

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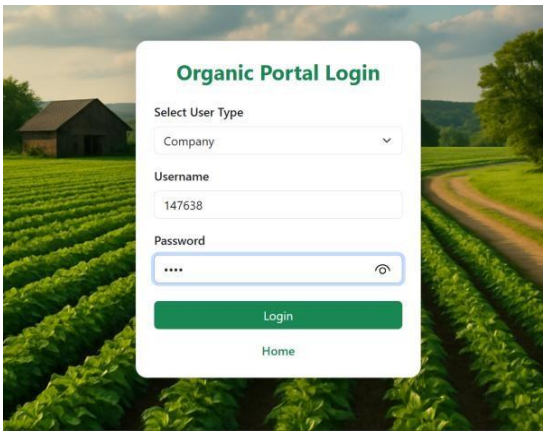
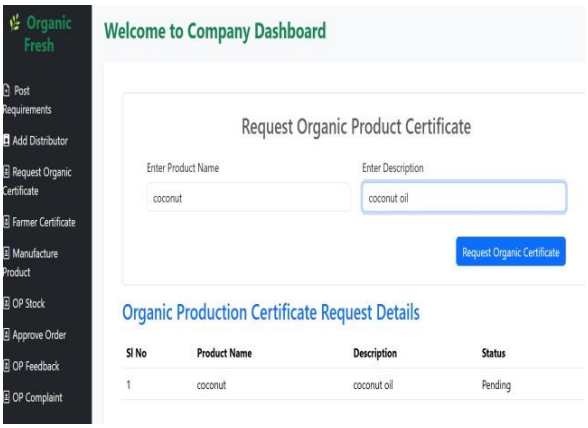
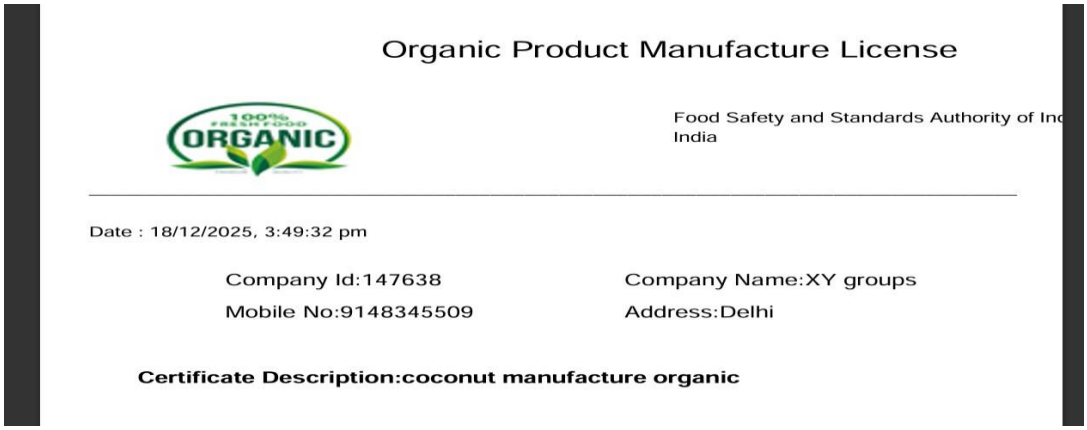
4. Company Page



Company Page-1

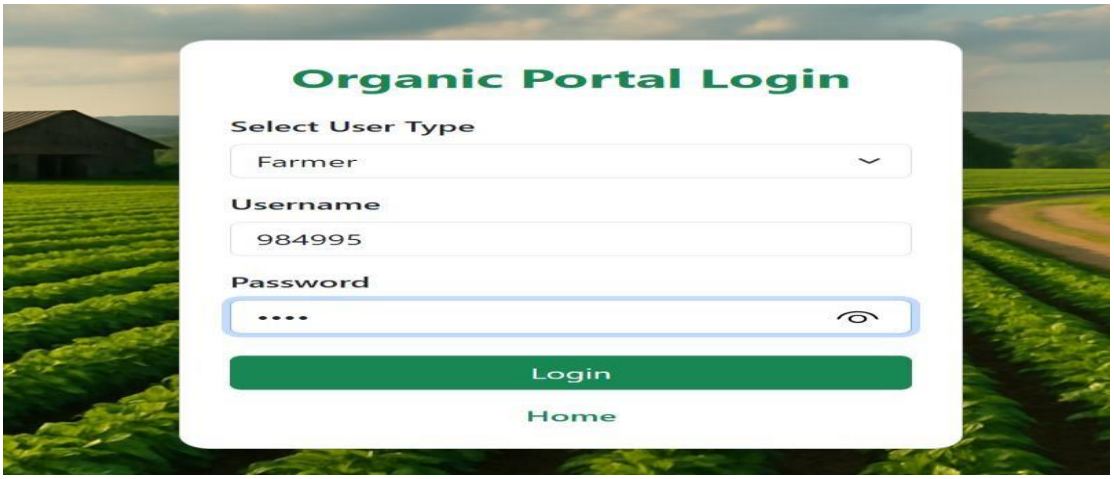


Company Page-2



Company Page-3

5. Farmer Page



Farmer Page-1

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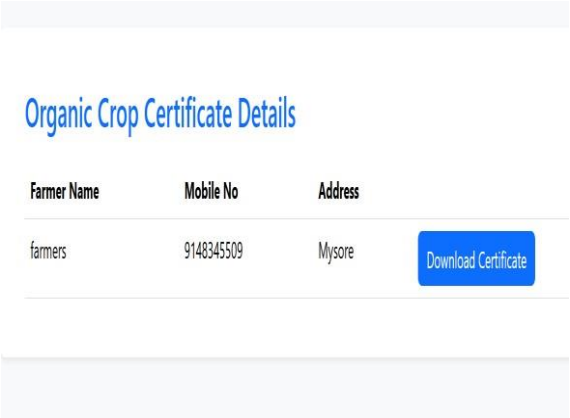
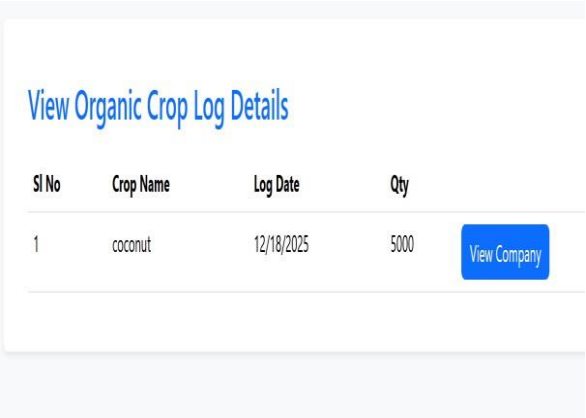
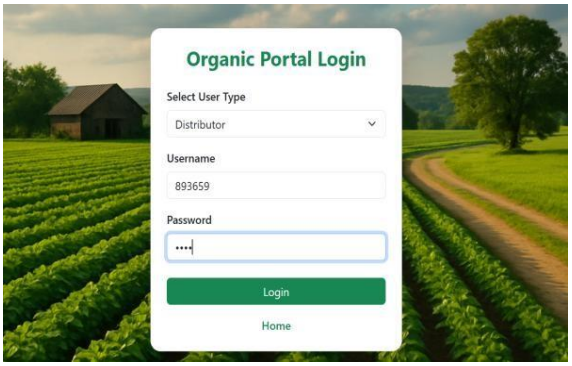


Farmer Page-2

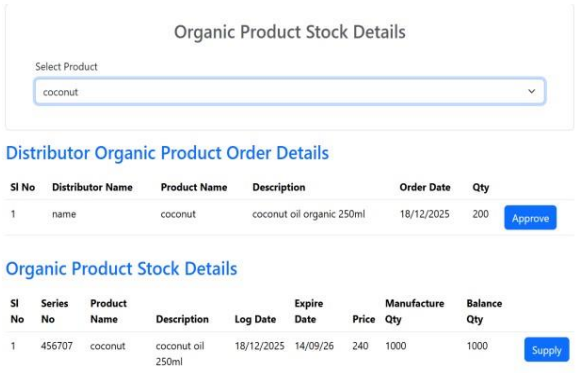


Farmer Page-3

6. Distributor Page

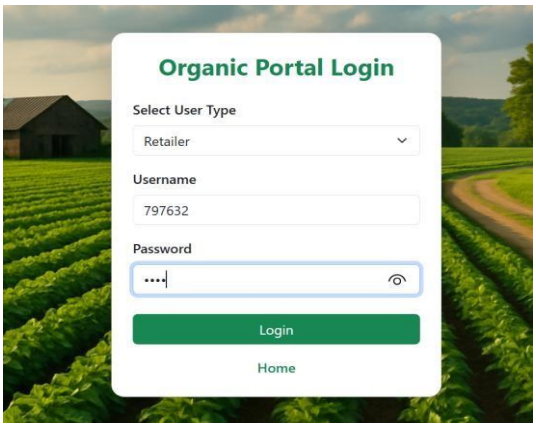


Distributor Page-1

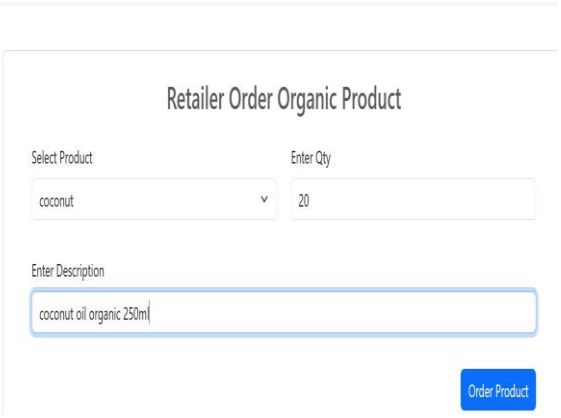


Distributor Page-2

7. Retailer Page



Retailer Page-1



Retailer Page-2

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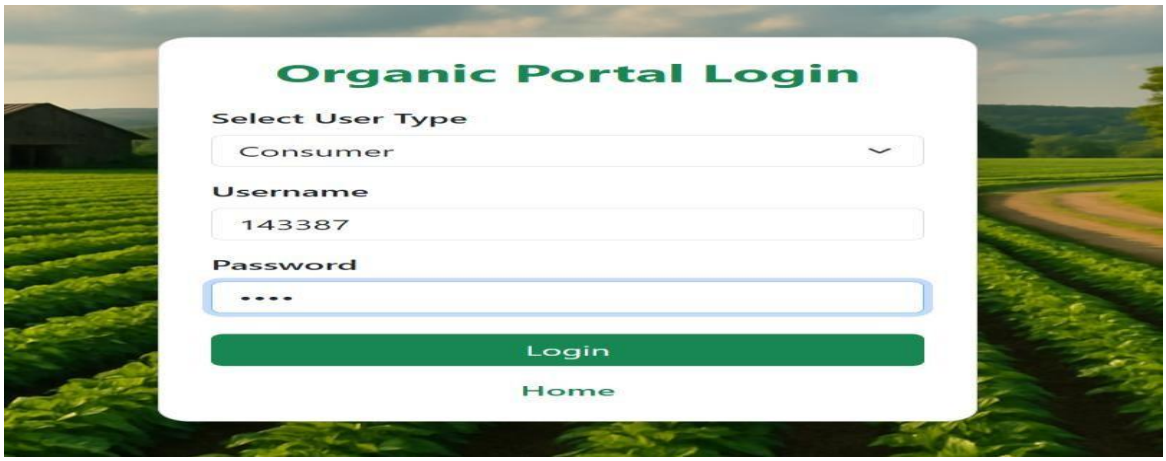
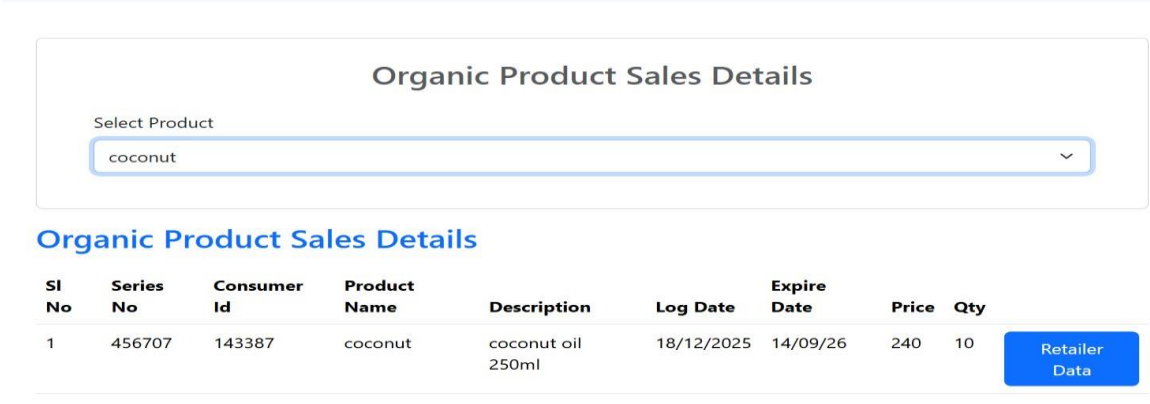
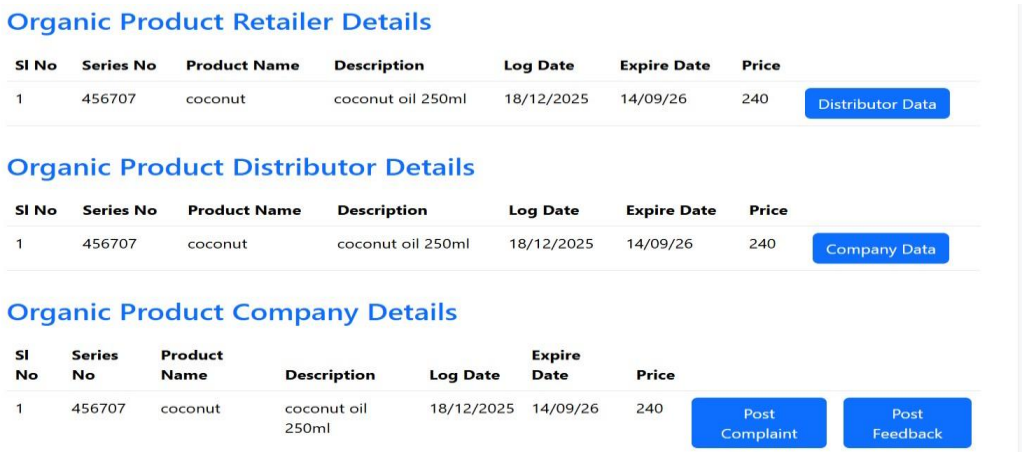
8. Consumer Page



Consumer Page-1



Consumer Page-2



Consumer Page-3

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