PROJECT NUTRISCAN

Empowering communities through technology

TEAM MEMBERS

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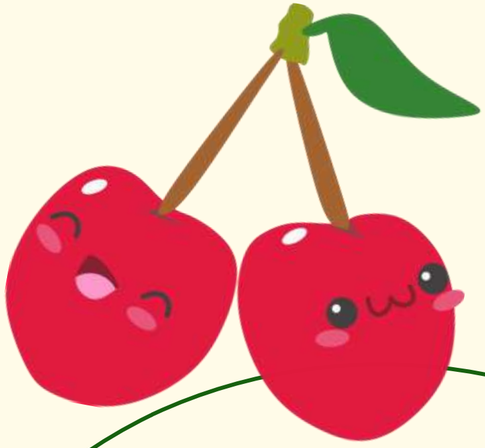


PROJECT OVERVIEW

The extensive **use of pesticides and fertilizers** in ***agriculture*** poses serious health risks, particularly for farmers and consumers. ***Contaminated fruits*** and ***vegetables*** often contain harmful residues, leading to food poisoning and long-term health issues.

01 -HEALTH IMPACTS:

It has 3 million poisoning cases and 200,000 fatalities annually.

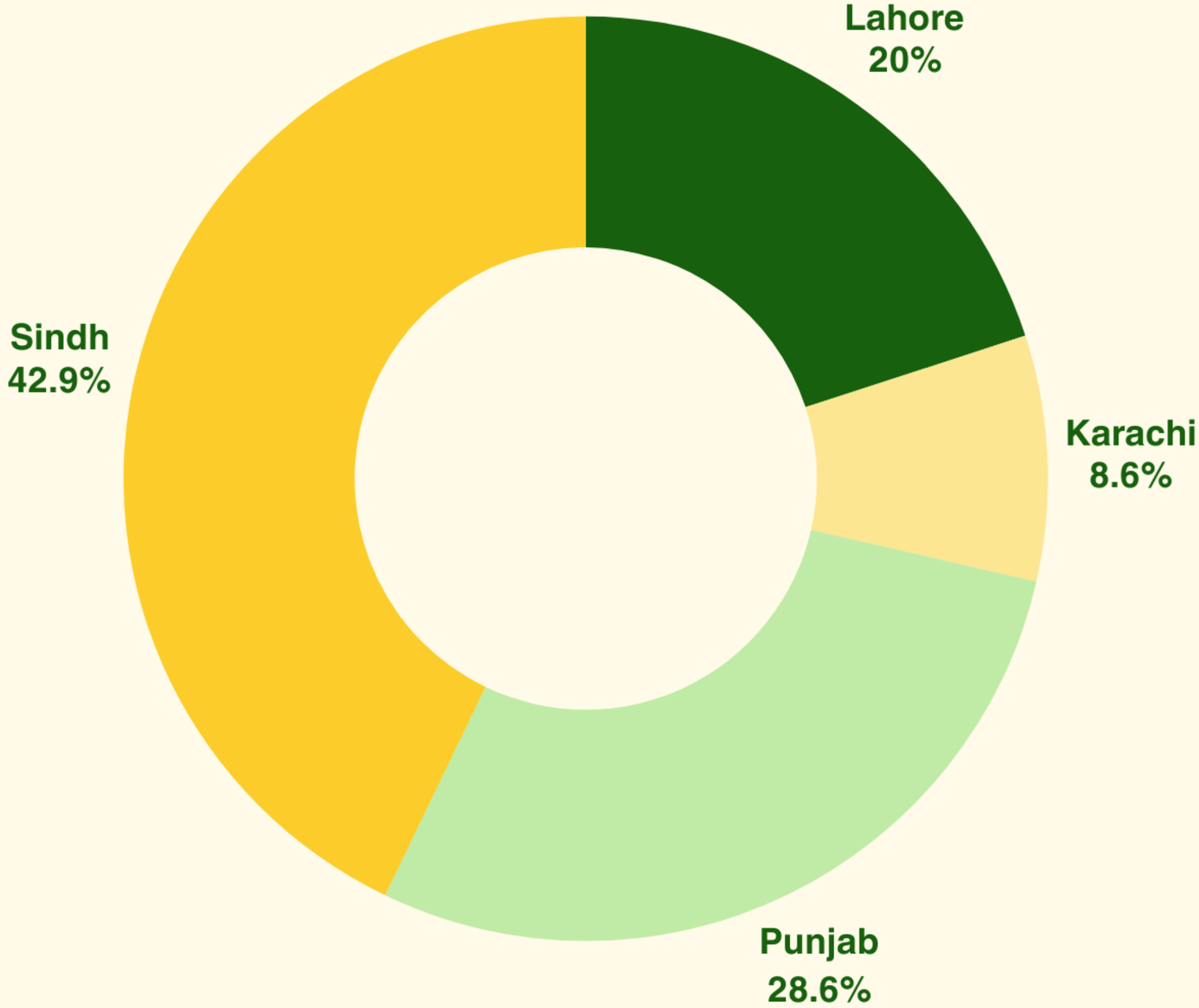
02 - LOCAL DATA

As of May 2021, Pakistan registered 382 pesticide active ingredients, including 23 extremely hazardous substances

03 - AWARENRSS GAP

Many people lack knowledge about poisonous produce and safe consumption practices.

CASE STATISTICS



PHASE - II
SOLUTION

01 -RESEARCH

Studied machine learning and image processing techniques like DurbeenNet, IoT systems, and KNN for detecting contaminated produce.

02 - SURVEY

Conducted a survey on fresh and contaminated produce, highlighting the need for a contamination detection app.

03 - UI WEBSITE

Built a prototype with features like image upload for contamination detection, safety info, and community engagement tools.

RESEARCH

WORKING

of the Methods for Detecting Chemical Adulteration in Fruits & vegetables

DURBEENNET MODEL

IOT-BASED DETECTION SYSTEMS

1 Data Acquisition

IMAGE CAPTURE

High-resolution images of fruits and vegetables are captured using a camera.

IOT SENSORS

Measure parameters like formaldehyde concentration or other chemical residues using connected sensors (e.g., gas or chemical sensors attached to Arduino).

2 Data Preprocessing

IMAGE PREPROCESSING

Images are enhanced to improve quality using techniques like cropping, resizing, and noise removal.

SENSOR DATA

The IoT device transmits raw chemical readings to the system via Wi-Fi or Bluetooth for further processing.

3 Feature Extraction

IMAGE FEATURES

The DurbeenNet model uses Convolutional Neural Networks (CNNs) to extract image features such as color irregularities, texture anomalies, and shape patterns indicative of chemical contamination.

SENSOR DATA ANALYSIS

Extracts numerical features like formalin levels or gas emission concentrations.

4 Model Training

IMAGE TRAINING

It is trained using a dataset of labeled images (toxic and non-toxic). Augmented data is used to improve robustness.

IOT DATA TRAINING

The sensor data is paired with numerical features to enhance classification accuracy.

5 Classification

ANALYSIS

Sensor data and image features are processed to classify the produce as:

- **Toxic**: High probability of chemical contamination.
- **Non-Toxic**: Low or no signs of contamination.

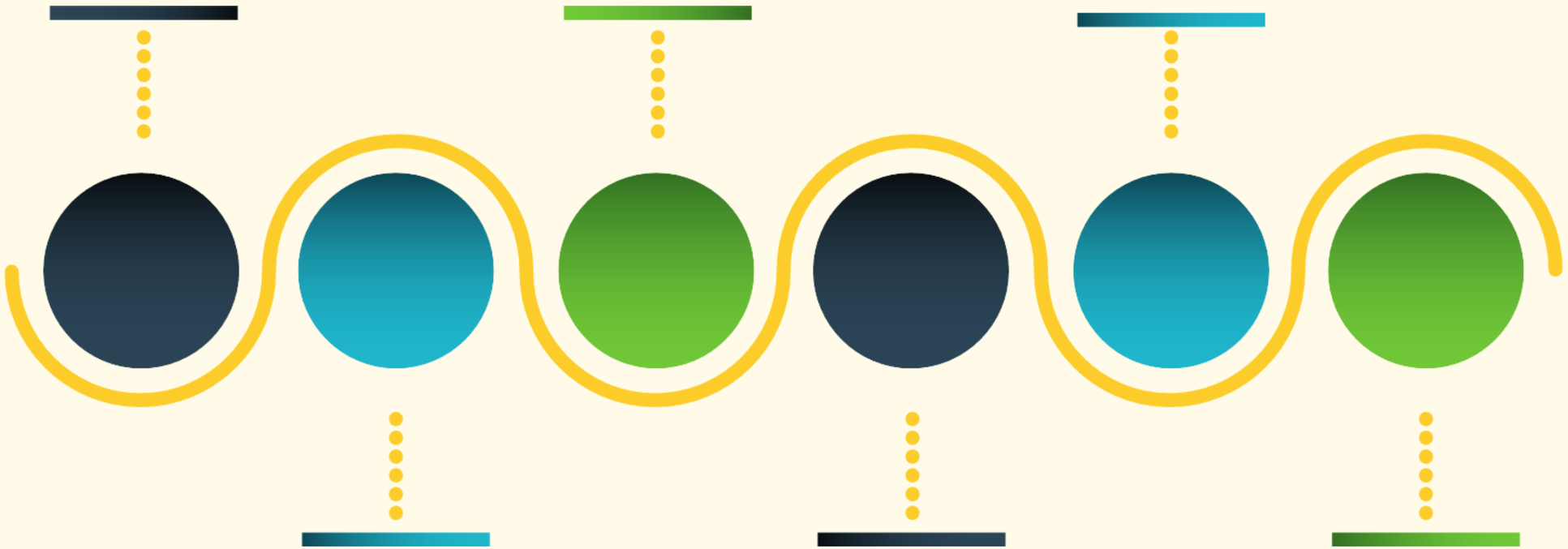
6 Results & Feedback

REAL TIME FEEDBACK

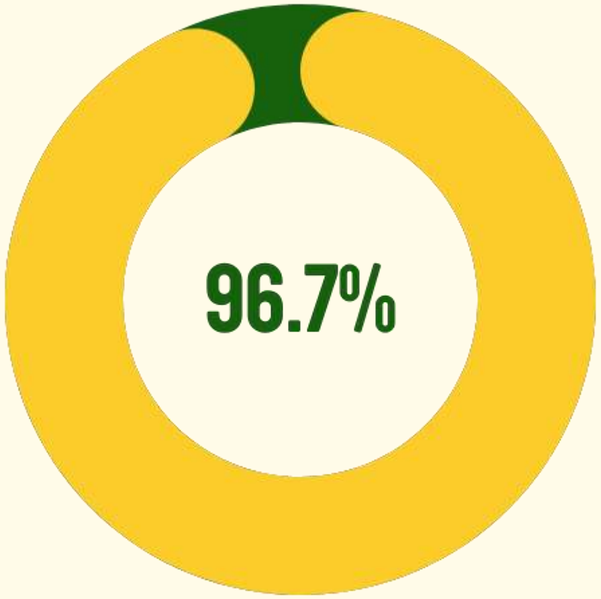
The system displays real-time feedback on a connected device.
Users receive:

- contamination details
- safety recommendations
- and next steps.

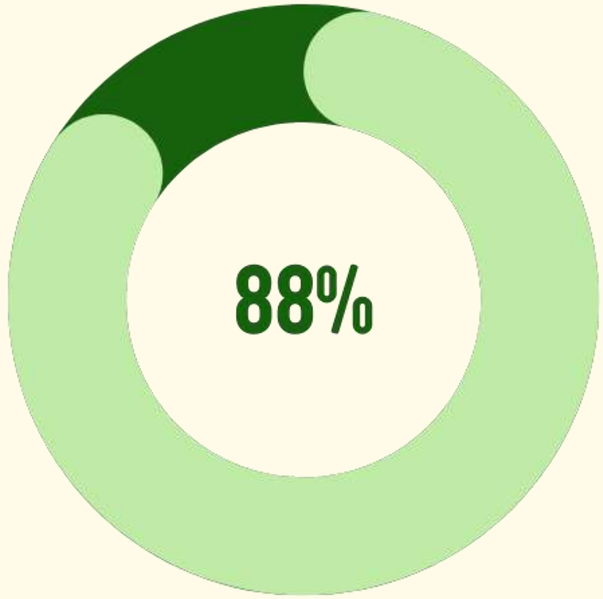
FLOWCHART


DATA ACQUISITION
DATA PREPROCESSING
FEATURE EXTRACTION
CLASSIFICATION
MODEL TRAINING
RESULTS

MODELS ACCURACY RATES



DURBEEN NET



IOT SENSORS

OTHER MODELS

Other then these mentioned models, there are many other models available which are used accordingly to the fruits or vegetables being processed and the type of procedures required on them. Some of the important ones are:

Method	Accuracy	Key Features
DurbeenNet	96.71%	Deep learning, CNN-based classification
YOLOv3 + CNN	High	Real-time object detection
IoT-Based Systems	88%	Sensor integration with ML analysis
KNN Algorithm	90%	Simple supervised learning
Graph Neural Networks	Predictive	Graph-based chemical interaction analysis
Transfer Learning	>90%	Pre-trained model adaptation

REFERENCES

- **DurbeenNet Model:** Deep learning model for detecting formaldehyde-treated fruits with 96.71% accuracy **(Source: PMC Article)**.
- IoT-Based Systems: Sensors with ML algorithms to measure formalin levels **(Source: TroIndia Study).**
- **KNN Algorithm:** Classifies fruit images based on contamination patterns with 90% accuracy **(Source: KSSEM Research).**
- **GNNs:** Models chemical effects on fruits using small-molecule interactions **(Source: Nature Research).**
- **YOLOv3 + CNNs**: Real-time detection of adulterated produce via color and texture patterns **(Source: IRJMETS Study).**

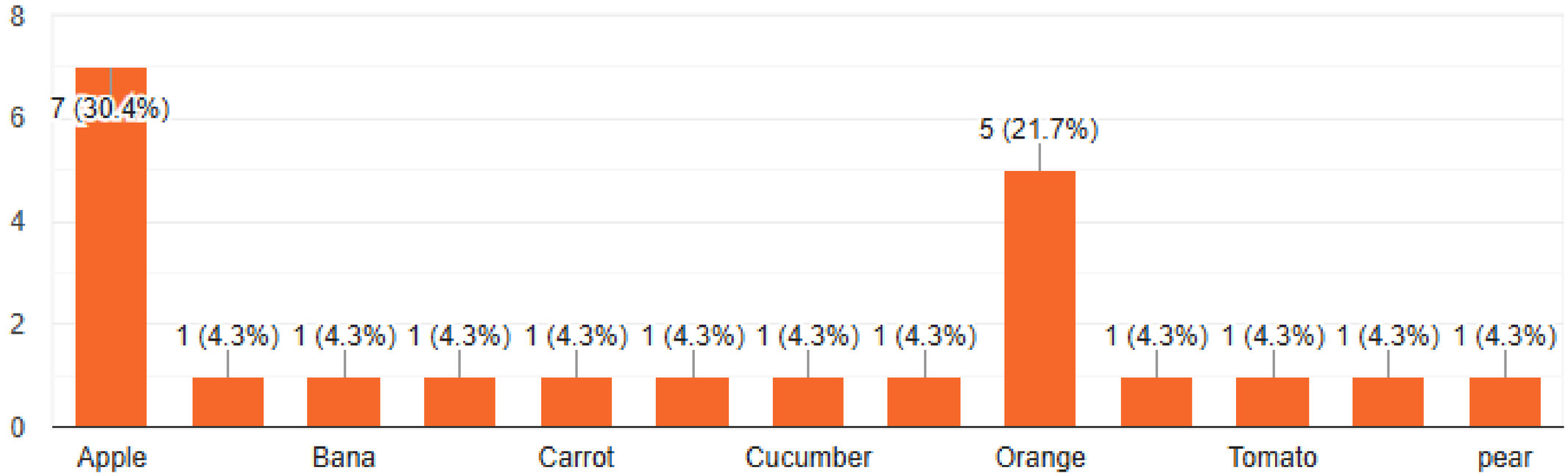
SURVEY

What fruit or vegetable is in the image?

(e.g., apple, banana, spinach)

23 responses

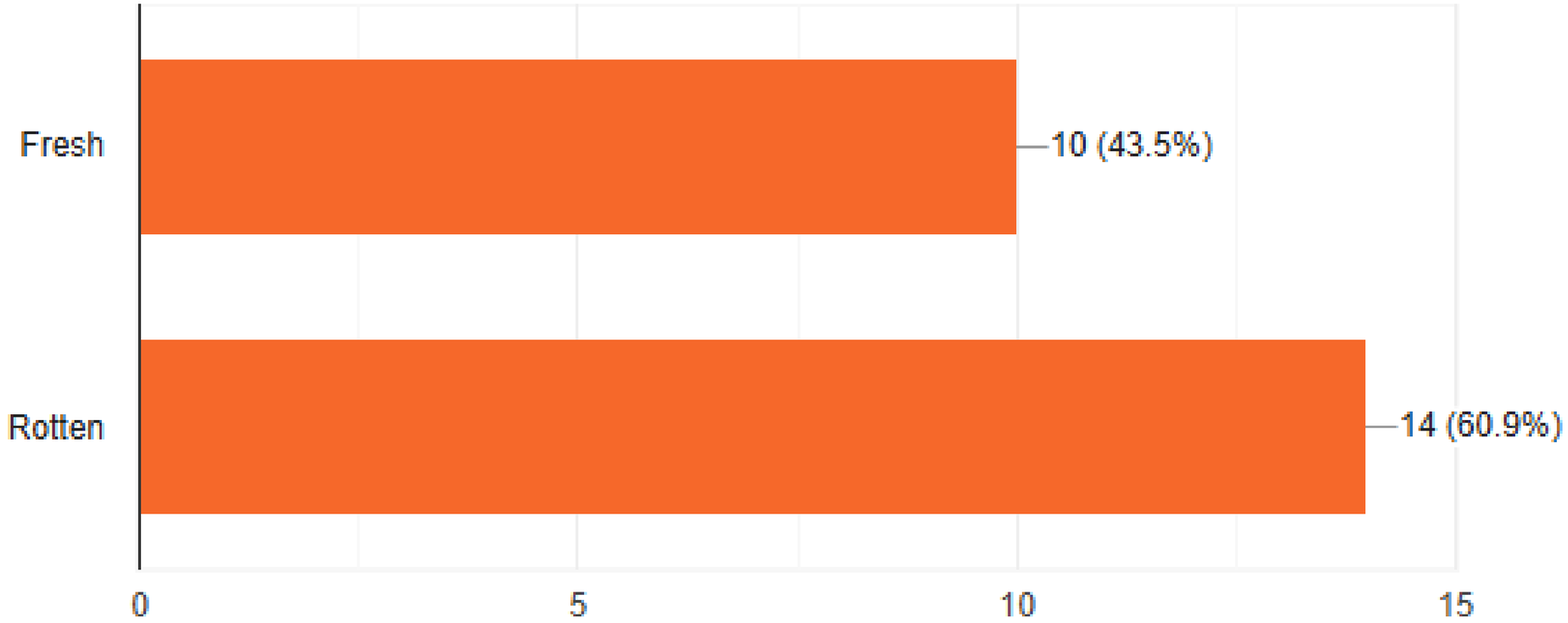
Copy chart



What is the condition of the fruit/vegetable?

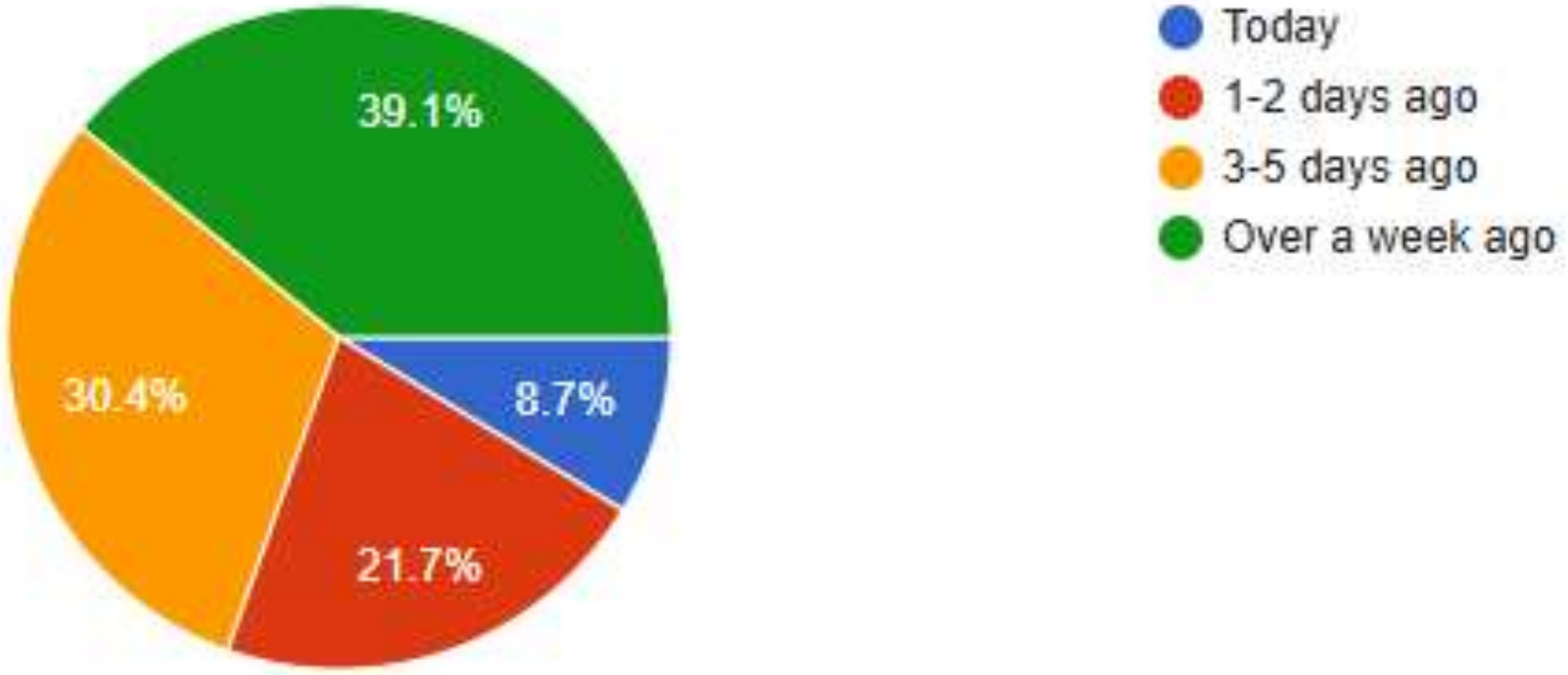
Copy chart

23 responses



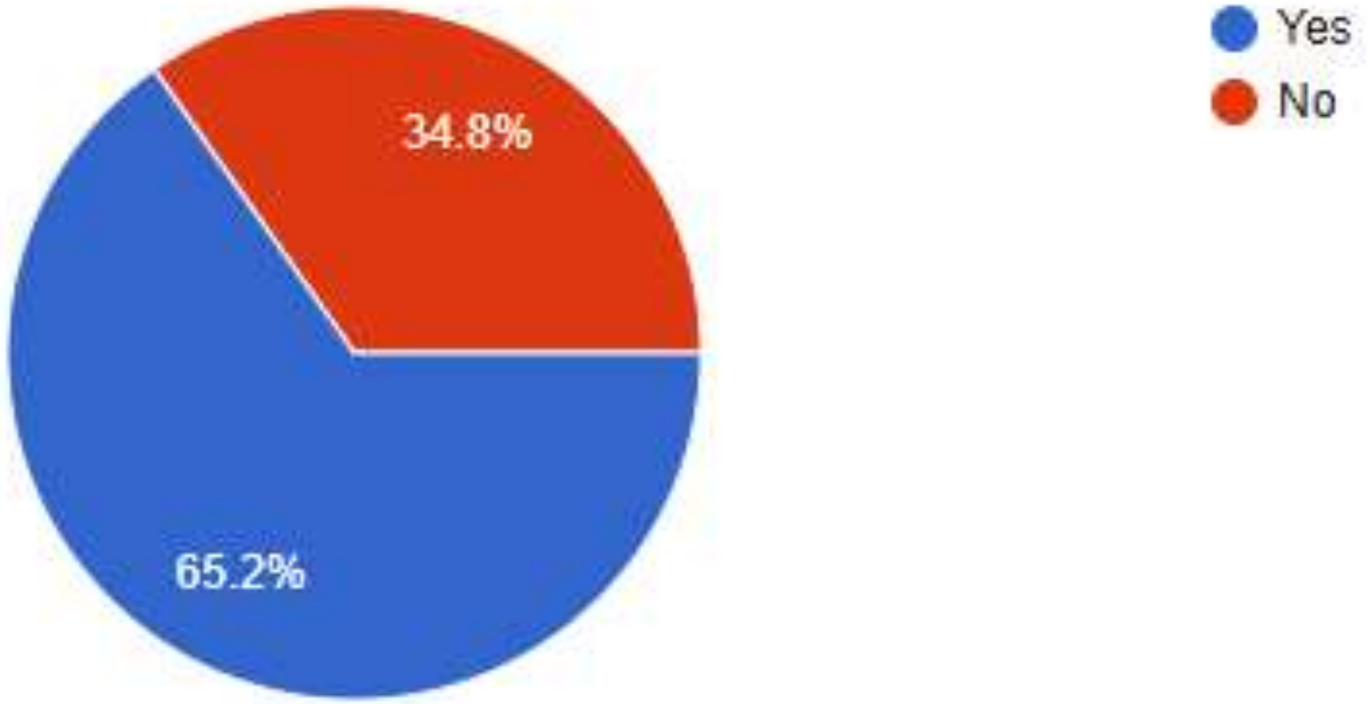
When did you buy the fruit or vegetable in the image?

23 responses



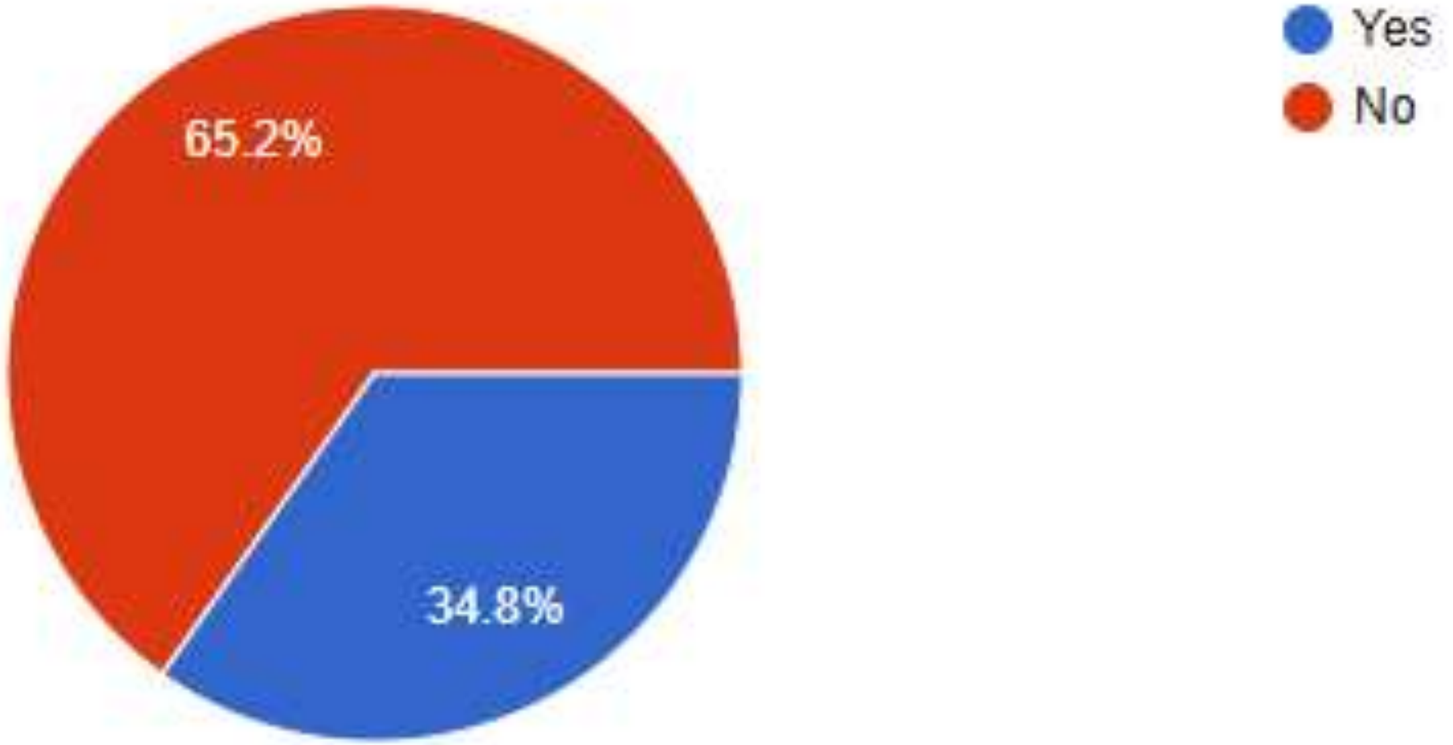
Have you noticed any changes in its appearance (color, texture)?

23 responses



Does it have an unusual smell?

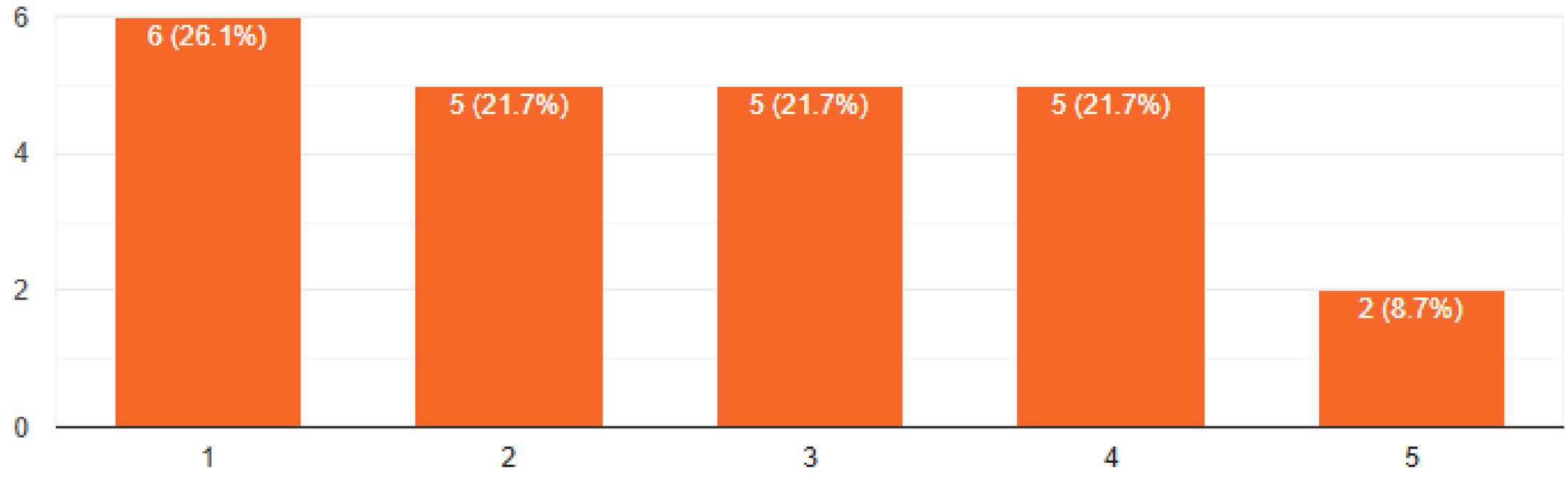
23 responses



How would you rate its quality?

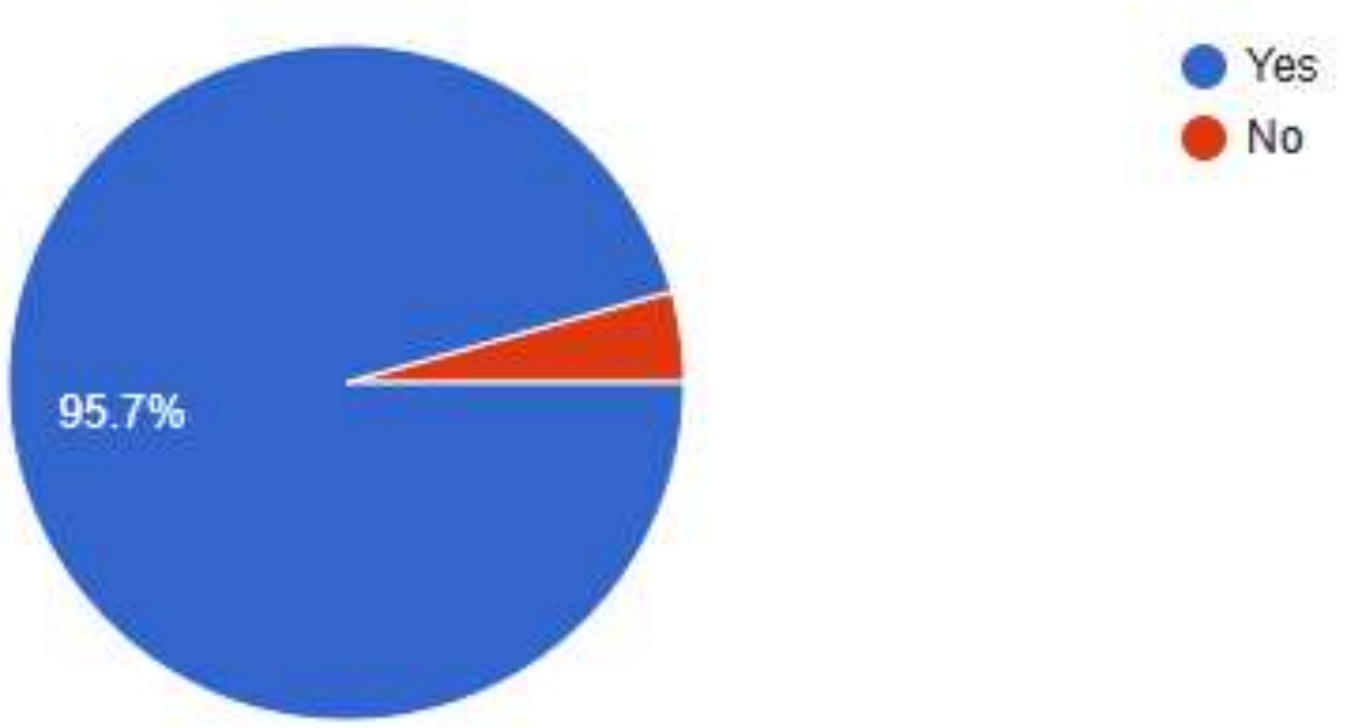
Copy chart

23 responses



Would you prefer a tool to detect chemical treatment in fruits/vegetables?

23 responses



WEBSITE

Take a look at our Fruity Website!

NUTRISCAN

Empowering communities through technology

NUTRISCAN

Upload an Image for Detection

- Click the camera icon in the top right to upload a fruit or vegetable image for analysis.

How to Identify Chemically Treated Produce

- ✓ Look for unnaturally shiny surfaces
- ✓ Check for unusual color patterns

Scan Results

EDIBLE

This produce appears to be safe for consumption.
No signs of chemical treatment detected.

Listen to Result

Scan Results

NOT EDIBLE

High levels of artificial waxing detected.
Possible presence of harmful preservatives.
Reasons:
- Unnatural shape
- Unusual color patterns
- Signs of artificial ripening

Listen to Result

FUTURE PLANS

PERSONALIZED DATA MODEL

Train a personalized ML model for improved accuracy and adaptability.

IOT LAB RESEARCH

Enhance detection with advanced sensors for real-time chemi monitoring.

APP LAUNCH

Release a full Nutriscan app with detection tools, resources, and user engagement.

FEATURE EXPANSION

- Advanced contaminant detection.
- Daily safety tips and user-reported alerts.
- AI-driven insights on contamination trends.
- Shopping assistant for safe produce recommendations.

THANK YOU!