

Quantitative Survey Methods Versus Qualitative Methods

Dr. KEHILI HE | 2025-2026



Introduction to Survey Methods



In biological sciences, research methodologies are traditionally associated with experimental designs, laboratory analyses, and field trials.



However, survey-based research methods play an increasingly important role, particularly when biological phenomena intersect with human practices, decision-making, perceptions, and socio-economic factors.

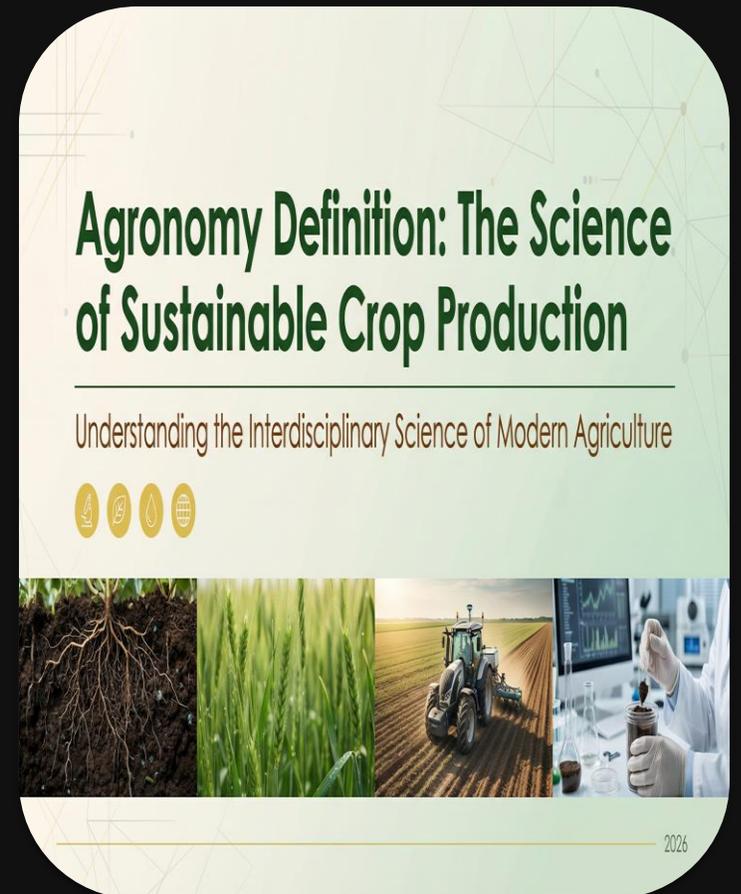


This is especially true in applied disciplines such as plant production, where agronomic performance, technology adoption, sustainability practices, and market dynamics are influenced by farmers, technicians, consumers, and institutions.



Teaching Objectives of Methods and Survey Practices

- ✔ Master the principles of questionnaire-based surveys
- ✔ Distinguish clearly between quantitative and qualitative survey methods
- ✔ Design appropriate survey instruments according to research objectives
- ✔ Use computer-based tools and survey software (e.g., Google Forms, LimeSurvey, KoboToolbox)
- ✔ Analyze and interpret survey data critically
- ✔ Apply survey methods to academic research and socio-professional projects



Guided Learning Approach

Overview of Survey Methods in Biological Sciences



Survey methods are research techniques used to collect data from a defined population through structured or semi-structured instruments such as questionnaires, interviews, or observations.

Common Uses



Assess practices (fertilizer use, irrigation strategies)



Evaluate perceptions (attitudes toward sustainable agriculture)



Collect socio-economic or behavioral data linked to biological outcomes



Complement experimental or field data

1. Survey design

- Questionnaire elaboration based on a literature review of irrigated agriculture in Mediterranean areas and former research in nearby areas.

2. Data collection

- Survey test
- Survey application to farmers in the study area who reported experiencing water shortages.
- Question regarding the implementation of 6 adaptation strategies

3. Latent Class Analysis

- Explore and determine the model that best fits the strategies to deal with water scarcity (model and number of classes selection)
- Addition of covariates and exploring the influence on class membership

Two Major Paradigms

- Quantitative
- Qualitative

Quantitative Survey Methods: Definition and Principles

Definition

Quantitative survey methods aim to collect numerical data that can be statistically analyzed. They rely on standardized instruments and closed-ended questions to measure variables objectively across a large sample.

Research Logic

The logic of quantitative surveys is deductive, often testing hypotheses or measuring predefined indicators.

Key Characteristics

- Numerical data collection
- Statistical analysis capability
- Standardized instruments
- Closed-ended questions
- Large sample sizes
- Objective measurement

Characteristics of Quantitative Surveys

- ✔️ Structured questionnaires
- 🔘 Closed-ended questions (multiple choice, Likert scales, yes/no)
- 👥 Large sample sizes
- 📊 Statistical analysis (descriptive and inferential)
- ✅ Emphasis on objectivity, reliability, and reproducibility



Core Approach

Standardized Instruments

Deductive Research Logic

Statistical Rigor

Quantitative Surveys in Biological Sciences

 Measure Frequency or Intensity of Practices

 Quantify Risk Factors or Behaviors

Affecting biological systems

 Evaluate Prevalence of Diseases, Pests, or Management Strategies

 Analyze Correlations Between Practices and Biological Outcomes



Key Applications

- Data-driven research
- Statistical validation
- Evidence-based conclusions
- Hypothesis testing

Application of Quantitative Methods to Plant Production

-  Estimating adoption rates of improved varieties
-  Measuring fertilizer or pesticide use patterns
-  Assessing yield variability linked to management practices
-  Conducting market studies (prices, demand, consumption frequency)

Practical Example

- Structured questionnaire distributed to 300 farmers
- Percentage using drip irrigation
- Average fertilizer input per hectare
- Yield levels before and after cultivar adoption

Role of Computer Tools in Quantitative Surveys

📄 Online Questionnaires

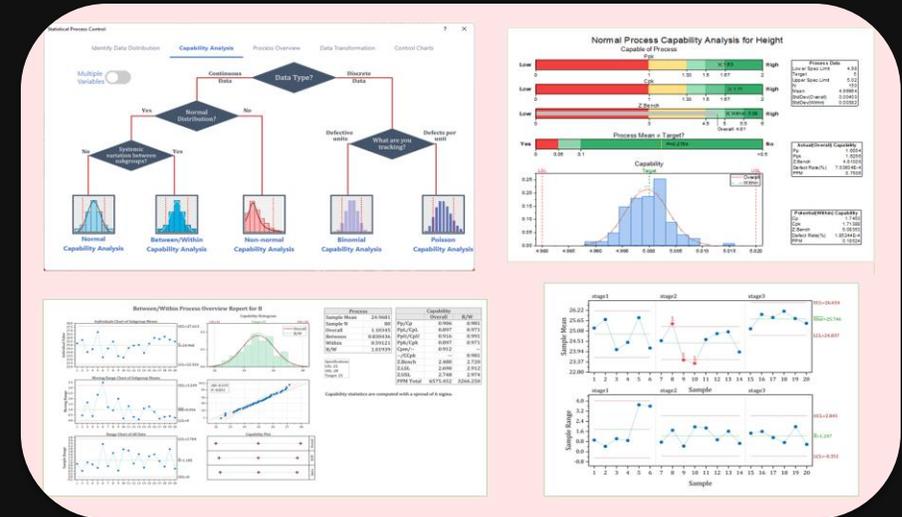
Google Forms, SurveyMonkey

📱 Mobile Data Collection

KoboToolbox

⬇️ Automated Data Export

Excel, SPSS, R



📈 Key Benefits

- Improve data accuracy
- Reduce operational costs
- Facilitate data analysis

Qualitative Survey Methods: Definition and Principles



Understanding Meanings, Perceptions, and Experiences

Rather than measuring quantities



Exploratory in Nature



Inductive Research Logic



Focus on Human Interpretation

Context and meaning



Core Objectives

- Uncover motivations
- Explore perceptions
- Understand behaviors
- Capture experiences

Characteristics of Qualitative Surveys

-  Semi-structured or Unstructured Instruments
-  Smaller Sample Sizes
-  Thematic or Content Analysis
-  Open-ended Questions
-  In-depth Data Collection
-  Emphasis on Context and Interpretation

Qualitative Methods in Biological Sciences

- 📍 Research Questions are Exploratory
- 🧠 Human Behavior or Perception Influences Biological Outcomes
- 📍 Contextual Understanding is Required



🌐 Interdisciplinary Research

- Biology
- Ecology
- Sociology
- Economics

Application of Qualitative Methods to Plant Production

- ☀️ Understand Farmers' Perceptions of Climate Change
- 🚫 Identify Barriers to Adopting Sustainable Practices
- 📖 Explore Traditional Knowledge and Local Practices
- 🧠 Analyze Decision-making Processes in Crop Management



🗨️ Practical Example

In-depth Interviews with Farmers

- Reasons for rejecting high-yield varieties
- Perceived risks of organic farming
- Cultural preferences influencing crop choice

Digital Support for Qualitative Surveys

While qualitative data are less standardized, digital tools are still essential for enhancing efficiency and accuracy in qualitative research.



Audio Recording & Transcription

Digital recording and automated transcription software



Qualitative Analysis Tools

NVivo, Atlas.ti for coding and thematic analysis



Online Interview Platforms

Virtual meeting and interview platforms

Comparative Analysis: Quantitative vs Qualitative Methods

	 Quantitative	 Qualitative
Type of Data	Numerical	Textual, narrative
Sample Size	Large	Small
Research Logic	Deductive	Inductive
Instruments	Structured questionnaires	Interviews, open questions
Analysis	Statistical	Thematic/content analysis

Complementarity of Methods (Mixed-Methods Approach)

In many biological and plant production studies, quantitative and qualitative methods are **complementary rather than opposed**.

ii. Quantitative Surveys

Identify **what** and **how much**

🧠 Qualitative Surveys

Explain **why** and **how**

💡 Example in Plant Production



- **Quantitative:** Percentage of farmers adopting new crop
- **Qualitative:** Reasons behind adoption or resistance

Importance for Academic Research and Theses

Survey methods are **essential** for advanced research in biological and plant sciences.



Socio-agronomic Studies



Extension and Technology Transfer Research



Sustainability and Environmental Impact Assessments



Research Excellence

- Design rigorous research protocols
- Align with scientific standards
- Ensure methodological validity

Importance for Socio-Professional and Market Studies

Survey skills are **equally valuable** outside academia.

 Market Feasibility Studies for Agricultural Products

 Consumer Preference Analysis

 Evaluation of Agricultural Projects and Startups

Critical Assessment

- Design and analyze surveys
- Assess project feasibility
- Evaluate market viability
- Make informed decisions

The ability to design and analyze surveys allows students to critically assess the feasibility and viability of their socio-professional projects.

Conclusion

Quantitative and qualitative survey methods are **indispensable tools** in modern biological sciences and plant production research.



Methodological Knowledge

Understanding research principles



Digital Tool Mastery

Practical skills with survey software



Research Excellence

Scientific rigor and validity



Professional Decision-Making

Agricultural and biological sectors

By integrating these methods into their academic training, students gain **versatile competencies** that support both scientific research excellence and professional decision-making in the agricultural and biological sectors.



Thank You for Your Attention

Quantitative Survey Methods Versus Qualitative Methods:

Applications in Biological Sciences and Plant Production



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