Financing Climate Resilience in Palestine: A Secondary Evidence Assessment

Abstract

This paper assesses what published evidence can establish about green-purpose finance and climate-smart agricultural practices in Palestine. It synthesizes official agricultural census statistics, a farmer survey conducted in parts of Hebron, and financial-sector evidence. These sources describe different populations, geographic areas, units of observation, and periods; they cannot be linked to estimate whether farmers who receive green finance adopt more practices or obtain better outcomes. The census records 140,568 agricultural holdings in 2020/2021, compared with 111,310 in 2009/2010, and cultivated area of 1,096,321 dunums, compared with 911,556 dunums. In a separate local sample of 205 farmers, Sultan (2021) reported mean scores of 3.85 for sustainable traditional practices, 4.31 for observing climate-change effects, and 3.82 for receptivity to climate-smart agriculture. A 2023 financial-sector survey reported green-purpose financing by 62% of banks and 44% of microfinance institutions, alongside gaps in climate-risk planning and disclosure. These descriptive indicators do not measure farmer access to green credit or its effects. The paper therefore identifies a data gap and outlines a testable farmer-level research design. Its policy implications are conditional: finance may support adoption when products fit farm conditions and are accompanied by appropriate technical advice, safeguards, and outcome monitoring.

Keywords: smallholder lending; technology uptake; water security; rural livelihoods; financial inclusion; adaptation investment.

1. Introduction

Smallholder agriculture in Palestine faces climate-related pressures, including variable rainfall, higher temperatures, and water scarcity. These pressures affect crop choices, irrigation requirements, and seasonal returns. Practices such as water-saving irrigation, soil conservation, adapted seeds, protected cultivation, and renewable energy may require investment before benefits are realized. Access to suitable finance and technical advice may therefore influence whether farmers can make these investments, although the relationship must be tested with linked farmer-level data (FAO, 2022; Li et al., 2024).

Green finance refers here to loans, guarantees, insurance, grants, or blended-finance arrangements intended to support activities with environmental or climate-resilience benefits. For agricultural borrowers, access alone is insufficient to describe a financing product. Cost, collateral, repayment timing, technical support, and eligibility conditions may affect whether a product is usable by small farms (Khoffash & Awwad, 2024; Retnoningsih & Chung, 2025).

Agricultural decisions in Palestine are shaped by water availability, farm size, land and input access, market access, and the reach of extension services. These conditions affect expected returns and repayment capacity. Palestinian climate and agricultural programmes address adaptation and resilience, but these policy activities do not by themselves show whether individual farmers receive green-purpose finance or change their practices (FAO, 2022; World Bank, 2023).

Sustainable finance has received growing attention in Palestine. The Palestine Monetary Authority's sustainable-finance roadmap discusses the financial sector's readiness and constraints, while research has examined banks' perspectives on green finance. Neither institutional-level evidence source establishes the effect of green credit on individual farmers' practices (Khoffash & Awwad, 2024; PMA, 2024).

Local farmer-level evidence is also geographically limited. The 2020/2021 Agricultural Census describes holdings and land use, while Sultan's (2021) survey covers 205 farmers in three locations in Hebron governorate and reports practices and perceptions related to climate-smart agriculture. The sources reviewed for this paper do not link a farmer's finance terms to that farmer's subsequent adoption outcomes. This paper therefore describes the available evidence and specifies the data needed for a farmer-level analysis.

This study has three aims: to describe published evidence on agricultural structure, farmer-reported practices, and financial-sector readiness in Palestine; to assess whether those sources permit an estimate of the relationship between green-purpose finance and climate-smart agricultural adoption; and to outline a design for future primary research. Because the source populations and units are not linked, the paper does not estimate an individual-level association or a causal effect.

2. Conceptual framework and literature

2.1 Climate-smart agriculture and adoption

Climate-smart agriculture (CSA) is commonly assessed against three objectives: sustainable productivity and income, adaptation to climate change, and, where measurable, mitigation of greenhouse-gas emissions (Lipper et al., 2014). These objectives can involve trade-offs. For example, irrigation may stabilize yields while increasing pressure on groundwater. The performance of a practice must therefore be evaluated in relation to local production and water conditions rather than inferred from its label alone (Li et al., 2024).

Adoption is multidimensional and should be measured through distinct indicators, such as awareness, trial, current use, land area covered, frequency, and continued use. Relevant practices may include rainwater harvesting, efficient irrigation, soil-moisture conservation, adapted seeds, crop diversification,

integrated pest management, protected cultivation, and renewable energy. Sultan (2021) documents traditional practices and farmers' receptivity to CSA in a local Hebron sample; these measures are not equivalent to national adoption rates.

2.2 Green finance and agricultural decisions

Finance may ease liquidity constraints when investments require upfront costs and generate returns over several seasons. Product features can affect borrowing costs, repayment fit with harvest cycles, risk sharing, and access to technical guidance. Evidence from China has also associated digital finance with adoption of green-control techniques among family farms, but this finding cannot be treated as an estimate for Palestine (Yu et al., 2020).

Financing can also create risks when repayments are inflexible, climate shocks reduce income, or an investment is poorly matched to the farm. Research on agricultural finance describes possible roles for financial education, cooperative arrangements, equipment sharing, and risk management, but the applicability and effects of these mechanisms require local testing (Retnoningsih & Chung, 2025).

2.3 Prior empirical findings

The linkage between CSA and a cluster of financial, information, household resourceful and entrepreneurial- and institutional-based factors has been found in international research. Ojo et al. (2023) investigate financing and adoption in Nigeria's rice sector, Kangogo et al. (2021) analyze farmer entrepreneurship and Li et al. (2024) identify determinants based on farming systems. Research in China focuses on exploring the influence of digital finance and cooperation network on green technology adoption (Yu et al., 2020; Zhang et al., 2026). These results contribute to the definition of hypotheses but don't provide estimates for Palestinian farmers.

Palestinian sources provide evidence on climate pressures, agricultural practices, and financial-sector readiness, but they use different observation units.

The sources reviewed here do not connect individual farmers' financing conditions with their practice outcomes (Al Abadla et al., 2021; Khoffash & Awwad, 2024).

2.4 Proposed analytical model

The proposed framework treats green-purpose finance as a potential enabling input, alongside extension and climate information. Water access, climate exposure, crop system, market conditions, farm size, tenure, education, gender, and household resources may also influence both access to finance and practice adoption. The framework is a proposal for future testing, not an estimated model in this paper (Li et al., 2024; Zhang et al., 2026).

For a future farmer-level study, the relationship could be specified as follows:

$$\text{Adoption}_i = \beta_0 + \beta_1\,\text{GreenFinance}_i + \beta_2\,\text{Extension}_i + \beta_3\,\text{ClimateInformation}_i + \beta_4\,\text{ClimateRisk}_i + \gamma X_i + \delta d + \varepsilon_i$$

Here, Adoption_i denotes the adoption or intensity of adoption for farmer i; GreenFinance_i denotes access to a finance product intended for an eligible environmental or resilience investment; Extension_i and $\text{ClimateInformation}_i$ measure advisory and information access; ClimateRisk_i captures exposure to relevant climate hazards; X_i represents household and farm characteristics; δd represents district effects; and ε_i is the error term. Estimation would require linked farmer-level observations and a design addressing selection into finance, reverse causality, and omitted variables. No coefficient is estimated in this paper.

3. Palestinian agricultural and financial context

The 2020/2021 Agricultural Census recorded 140,568 agricultural holdings and 1,096,321 dunums cultivated with field crops, vegetables, and tree horticulture. The West Bank accounted for 82.4% of holdings and 89.4% of this cultivated area; the Gaza Strip accounted for 17.6% and 10.6%, respectively.

These figures describe agricultural structure and do not measure farmers' access to green-purpose credit (PCBS & Ministry of Agriculture, 2022, 2023).

Agricultural investment decisions are affected by water scarcity, rainfall variability, and access to markets. Palestinian climate and agricultural programmes address resilience, while the PMA roadmap concerns financial-sector readiness. The sources reviewed here do not provide linked loan and farmer-outcome records that would support an estimate of the finance–adoption relationship (FAO, 2022; PMA, 2024; World Bank, 2023).

4. Data and methods

4.1 Research design

This exploratory study uses secondary sources: official agricultural statistics, published results from a survey of farmers in Hebron, and financial-sector evidence. It describes these sources separately and assesses whether they can support estimation of a farmer-level relationship between green-purpose finance and CSA adoption. Because their populations, locations, time periods, and observation units differ, the indicators are not pooled and no causal effect is inferred from cross-source percentages.

Sources were selected for their relevance to Palestinian agricultural structure, farmer-reported practices, green finance, and climate adaptation. The evidence base includes official census material, policy and financial-sector reports, peer-reviewed research, and the Al-Quds University thesis reporting the Hebron farmer survey. Sultan (2021) studied 205 farmers in Halhul, Surif, and South Dura, in Hebron governorate. This is a purposeful exploratory synthesis, not a systematic review or meta-analysis; it does not claim exhaustive coverage of all available publications.

4.2 Measures and Source comparability

For this paper, green-purpose finance means a loan, guarantee, insurance product, grant, or other financing arrangement intended to fund an environmentally beneficial or climate-resilient investment. Institutional reports describe financial institutions' stated activities and readiness; they do not identify the share of farmers who received green credit. Sultan's measures describe farmer-reported practices and perceptions in a local sample and are not national adoption estimates. The source-specific measures are therefore reported separately.

CSA adoption is treated as a set of observable practices involving water, soil, crops, seeds, diversification, or lower-impact production. A future farmer survey should record current use, year of introduction, land area covered, frequency, investment cost, and whether the investment was financed. Adoption incidence and intensity should be measured separately (Li et al., 2024; Ojo et al., 2023).

4.3 Analytical procedure

For each source, the analysis retains its original population, geographic coverage, observation unit, and reference period. Census percentage changes were recalculated from the published counts and areas and rounded to one decimal place. Other values are reported as published. No synthetic observations, regression coefficients, significance tests, or national farmer-adoption rates were generated.

4.4 Proposed model for primary data

A future primary study could measure adoption as a binary outcome, a count of practices, or an intensity measure, depending on the research question. Finance exposure should capture the source, amount, purpose, fees, collateral, grace period, repayment schedule, and date received. Potential covariates include farm size and tenure, crop type, household labor, education, gender, extension access,

climate information, income diversification, water access, and recent climate shocks. Panel data or a documented quasi-experimental design could strengthen identification; the final strategy should be specified in advance and accompanied by robustness checks.

5. Ethics approval and informed consent

This manuscript analyzes previously published and publicly available sources. The authors did not recruit or interact with participants and collected no new participant-level data. The farmer questionnaire findings are reported in Sultan (2021), a publicly available thesis. The thesis record reviewed for this paper does not state whether a research ethics committee approved or waived the original survey or whether informed consent was obtained. This manuscript therefore makes no claim about the original survey's ethics approval or consent procedures. Ethics review and consent for the present secondary analysis were not applicable because no new human-participant data were collected.

6. Results

6.1 Agricultural scale and land distribution

Between the 2009/2010 and 2020/2021 agricultural censuses, the number of holdings increased from 111,310 to 140,568, a rise of 26.3%. The area cultivated with field crops, vegetables, and tree horticulture increased from 911,556 to 1,096,321 dunums, a rise of 20.3%. Over the same census comparison, field-crop area decreased by 10.2%, vegetable area increased by 58.9%, and tree-horticulture area increased by 24.8%. These shifts describe changes in land use; they do not establish changes in farm profitability, financing needs, or climate risk (PCBS & Ministry of Agriculture, 2022, 2023).

Table 1. Agricultural holdings and cultivated area in Palestine, 2009/2010 and 2020/2021.1

Indicator	2009/2010	2020/2021	Change	Unit or definition
Number of agricultural holdings	111,310	140,568	+26.3%	Holdings
Total cultivated area	911,556	1,096,321	+20.3%	Dunums
Field-crop area	241,936	217,206	−10.2%	Dunums
Vegetable area	127,257	202,285	+58.9%	Dunums
Tree-horticulture area	542,363	676,830	+24.8%	Dunums
West Bank cultivated area, 2020/2021	—	979,752	—	89.4% of cultivated area
Gaza Strip cultivated area, 2020/2021	—	116,569	—	10.6% of cultivated area

Census values are reproduced as published. Percentage changes were calculated from the displayed counts and areas and rounded to one decimal place. One dunum equals 1,000 square metres. The West Bank and Gaza figures are regional components of the 2020/2021 total, not additional cultivated area (PCBS & Ministry of Agriculture, 2022, 2023).

In 2020/2021, the West Bank accounted for 82.4% of agricultural holdings and 89.4% of the cultivated area included in these figures. The Gaza Strip accounted for 17.6% of holdings and 10.6% of cultivated area. These shares describe regional distribution and should not be interpreted as measures of output, productivity, or access to finance (PCBS & Ministry of Agriculture, 2022). Figure 1 presents the census comparison.

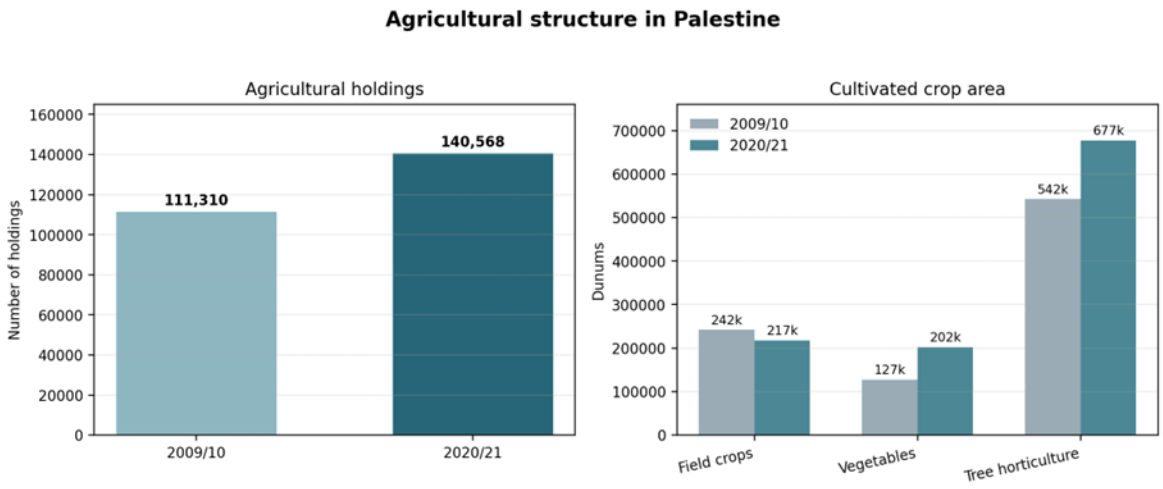


Figure 1. Change in agricultural holdings and crop area between the 2009/2010 and 2020/2021 agricultural censuses.1

Figure 1 reports holdings and cultivated area using their respective units. The crop-area comparison covers field crops, vegetables, and tree horticulture, as defined in the census (PCBS & Ministry of Agriculture, 2023).

6.2 Holding structure and crop composition in Gaza

In the 2020/2021 census, the Gaza Strip had 24,754 agricultural holdings, or 17.6% of the Palestinian total. The census reported that 99.7% were family holdings and 74.2% were smaller than three dunums; the average holding size was 3.6 dunums. Production for sale was reported as the main purpose for 73.4% of holdings. The reported cultivated area was approximately 117,000 dunums, with Khan Younis and North Gaza accounting for 32% and 29%, respectively (PCBS, 2023). Table 2 summarizes these indicators.

Table 2. Agricultural holding structure and cultivated area in Gaza, 2020/2021.2

Indicator	Value	Denominator or geographic reference
Agricultural holdings	24,754	Gaza Strip, all holding types
Share of Palestinian holdings	17.6%	24,754 of 140,568 holdings
Family holdings	99.7%	All Gaza holdings
Holdings under 3 dunums; average holding size	74.2%; 3.6 dunums	All Gaza holdings; Gaza Strip average
Holdings with sale as the main production purpose	73.4%	All Gaza holdings
North Gaza holdings	6,112 (24.7%)	Gaza holdings; North Gaza governorate

Cultivated area	Approximately 117,000 dunums	Gaza Strip; field crops, vegetables, and tree horticulture
Cultivated-area shares in Khan Younis and North Gaza	32%; 29%	Gaza cultivated area, respectively

The categories and denominators follow the PCBS release. The 74.2% figure refers to holdings below three dunums. Family status, holding size, production purpose, and geographic distribution are separate classifications and should not be summed across rows (PCBS, 2023).

The census reported that vegetables accounted for 53.0% of Gaza's cultivated area and tree horticulture for 30.9%; field crops accounted for the remaining 16.1%, calculated as the difference from 100%. Olive trees represented 63% of the area under tree horticulture in Gaza. These crop shares indicate the composition of cultivated land, but they do not identify which practices farmers used or how those practices were financed (PCBS, 2023). Figure 2 presents selected holding and crop-composition indicators.

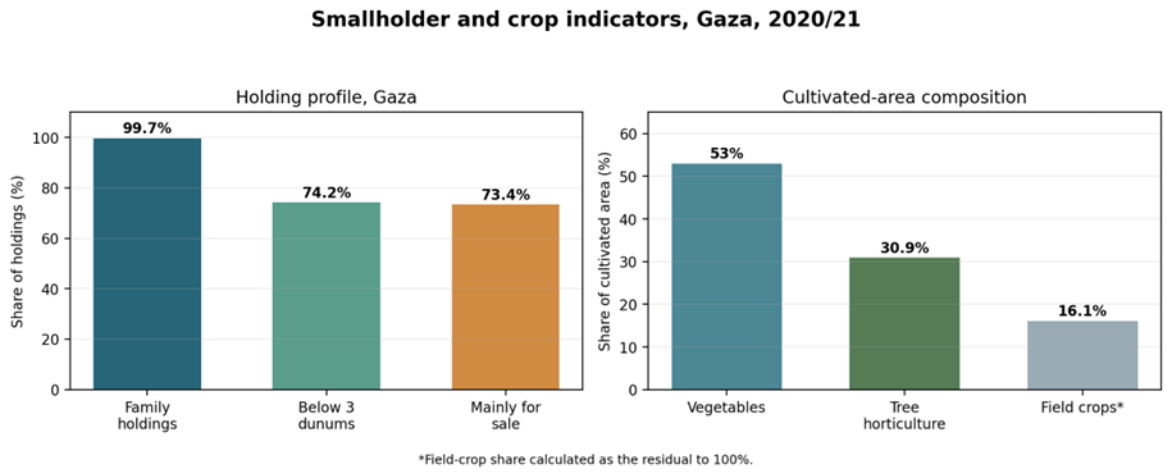


Figure 2. Smallholder and crop-structure indicators reported for Gaza.2

Panel A presents the reported proportions of family holdings, holdings below three dunums, and holdings primarily producing for sale. Panel B presents cultivated-area composition; the field-crop share of 16.1% is calculated as the remainder after subtracting the reported vegetable and tree-horticulture shares from 100% (PCBS, 2023).

6.3 Practices Reported by Farmers and Their Perceptions of Climate

Sultan (2021) used an interviewer-administered questionnaire with 205 farmers in Halhul, Surif, and South Dura in Hebron governorate. The thesis reports mean scores of 3.85 for sustainable traditional agricultural practices, 4.31 for farmers' observations of climate-change effects, and 3.82 for receptivity to CSA. Reported examples include ploughing when soil moisture is suitable and selecting local seeds adapted to temperature stress and local pests. These findings apply to the study sample and should not be generalized to all Palestinian farmers (Sultan, 2021). Table 3 summarizes the sample and reported measures.

Table 3. Sample design and farmer-reported measures in the Hebron study.3

Study element or measure	Reported detail	Interpretation or limitation
Sample size	205 farmers	Study sample, not national population
Study locations	Halhul, Surif, and South Dura	Hebron governorate
Data collection	Questionnaire administered in interviews	Farmer-reported responses
Analysis software	SPSS	Descriptive and inferential analysis reported in thesis
Sustainable traditional agricultural practices	Mean = 3.85	Described by the thesis as high
Observation of climate-change effects	Mean = 4.31	Described by the thesis as high
Receptivity to climate-smart agriculture	Mean = 3.82	Described by the thesis as high
Frequently mentioned practices	Moisture-appropriate ploughing; local seeds adapted to heat, frost, cold spells, and pests	Practice examples, not adoption percentages

The three means are reported in the thesis abstract. The source material reviewed does not provide an individual-item distribution or a sampling frame that supports national representativeness. The scores should therefore be interpreted using the scale and sample described in the thesis, not as percentages of farmers adopting specific practices.

The reported practices include traditional methods that may not require the same investments as irrigation infrastructure, rainwater harvesting, or renewable

energy. A future study should measure each practice and financing product separately rather than combining them into a single adoption score without validation (Li et al., 2024; Sultan, 2021). Figure 3 displays the reported mean scores.

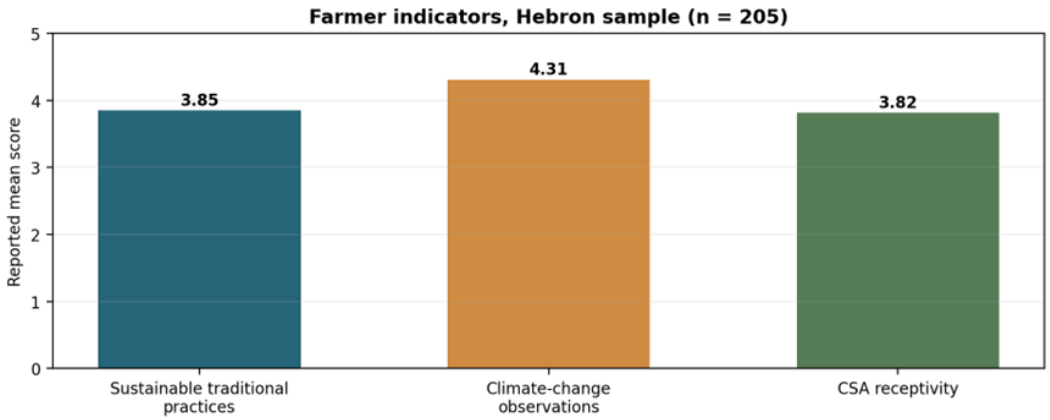


Figure 3. Farmer-reported climate-smart agriculture indicators in the Hebron sample.3

The bars show three mean scores from the same Hebron study. They are scale scores, not the percentage of farmers using each practice, and they are not directly comparable with the institutional percentages in Figure 4 (Sultan, 2021).

6.4 Readiness of the financial sector and green finance

The World Bank's May–June 2023 survey covered 13 banks and nine microfinance institutions. Among the surveyed institutions, 62% of banks and 44% of microfinance institutions reported financing green purposes, including solar energy, climate-smart agriculture, and transport. More than 80% supported a dedicated green-credit guarantee programme. The report also found that climate-related risks were absent from strategic planning at 54% of banks and 67% of microfinance institutions; 14% of institutions publicly disclosed climate-related or environmental data, and 95% lacked an internal green taxonomy (World Bank, 2023, p. 43). Table 4 summarizes selected indicators.

Table 4. Financial-sector green-finance engagement and climate-risk readiness.4

Indicator	Banks	Microfinance institutions	All surveyed institutions or note

Institutions surveyed	13	9	Total = 22
Reported financing for green purposes	62%	44%	Solar energy, climate-smart agriculture, transport
Climate risk absent from strategic planning	54%	67%	Self-reported survey result
Support a dedicated green credit guarantee program	—	—	More than 80%
Believe climate risks to clients are high or moderate	—	—	More than 60%
Publicly disclose climate/environmental data	—	—	14%
Lack an internal green taxonomy	—	—	95%
Implementation capacity	—	—	4 institutions had partly dedicated staff; 4 had assessment procedures, mostly in development; 1 had a sustainability department

Percentages are self-reported and reproduced as presented in the source. The report does not provide an item-specific response count for every indicator. Dashes in Table 4 indicate that the source reports a combined figure or does not disaggregate the result. These data describe financial-sector readiness, not the number or share of smallholder farmers receiving green credit (World Bank, 2023, p. 43).

The survey documents institutional engagement alongside reported gaps in climate-risk planning, disclosure, and classification. The bank and microfinance percentages are descriptive and do not show which provider offers more affordable credit or serves more smallholders. A farmer-level assessment would require loan records disaggregated by sector, borrower size, location, product, price, collateral, repayment terms, and financed practice (Khoffash & Awwad, 2024; World Bank, 2023).

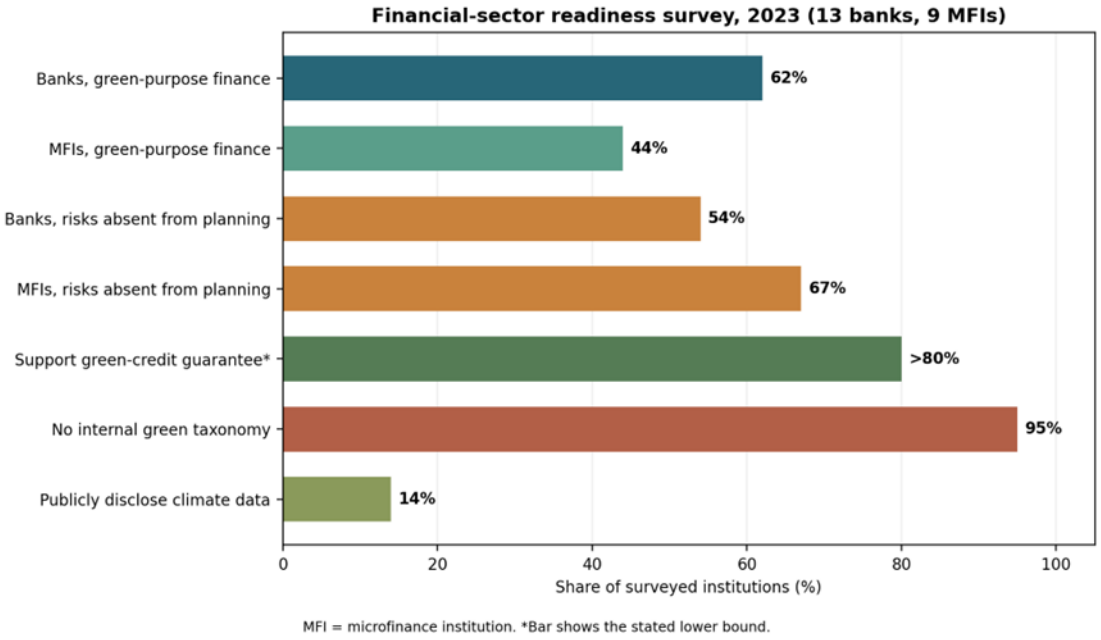


Figure 4. Selected indicators of green-finance activity and climate-risk readiness among Palestinian financial institutions.4

The chart presents self-reported percentages from the 2023 survey of 13 banks and nine microfinance institutions. The guarantee-programme response is shown as "more than 80%," not as an exact point estimate. Because indicators measure different dimensions, they should not be combined into a single readiness score (World Bank, 2023, p. 43).

6.5 Evidence on the finance-adoption mechanism

International studies examine links between financing and sustainable agricultural practices in different settings. Ojo et al. (2023) study financing and CSA adoption among smallholder rice farmers in Nigeria; Yu et al. (2020) examine digital finance and green-control practices among Chinese family farms; and Retnoningsih and Chung (2025) analyze climate finance, financial literacy, and credit and savings behaviour among smallholders in Indonesia. These studies suggest mechanisms involving liquidity, information, financial literacy, and risk management. Their estimates and findings are not directly transferable to Palestine, given differences in crops, land access, climate exposure, and financial institutions.

The comparative literature can guide measurement in a Palestinian farmer survey, but it cannot supply a Palestinian effect estimate. The survey should record finance purpose and terms, extension contact, financial literacy, water access, crop system, market distance, and climate shocks. Adoption measures should distinguish initial uptake from continued use and establish whether financing preceded the change. Tracking the same farms over time would help evaluate persistence and farm outcomes.

The Palestinian sources have different observation units: the census covers holdings and cultivated land; the financial-sector survey covers institutions; and the Hebron thesis reports individual farmer responses. They can be summarized side by side but cannot be linked to estimate the relationship between farmers' finance access and adoption. This paper reports no farmer-level coefficient or causal effect.

6.6 Summary of findings

The descriptive evidence supports four findings. First, the number of agricultural holdings and the area cultivated with field crops, vegetables, and tree horticulture were higher in 2020/2021 than in the earlier census comparison. Second, Gaza's holdings were predominantly family holdings, and most were below three dunums; the reported cultivated area was concentrated in Khan Younis and North Gaza. Third, the Hebron survey reported farmer means related to traditional practices, climate observations, and receptivity to CSA, but its local sample is not nationally representative. Fourth, surveyed financial institutions reported some green-purpose financing while also reporting gaps in climate-risk planning and disclosure.

These descriptive findings establish the relevance of further farmer-level research but do not show that green-purpose finance changes adoption. The evidence gap is the absence, among the reviewed sources, of linked data on farmers' finance terms, practice adoption, and subsequent farm outcomes.

7. Discussion

The sources document activity at institutional and farmer levels, but they do not link the two. The financial-sector survey records institutions' reported financing activity, while the Hebron thesis records farmer-reported practices and perceptions in a separate local sample. Consequently, the available evidence cannot establish whether farmers who received green-purpose finance adopted more CSA practices or achieved different outcomes.

Institutional participation in green finance should not be treated as evidence of smallholder access. Reported financing may cover activities beyond smallholder agriculture, including solar energy and transport. Future reporting should distinguish agricultural green credit from other green-purpose finance and record applications, approvals, amounts, collateral, fees, grace periods, repayment schedules, locations, borrower categories, and financed practices (Khoffash & Awwad, 2024; PMA, 2024).

Financial products should be evaluated against the cost, expected timing of returns, and risks of the financed practice. Water harvesting and soil conservation may produce benefits over several seasons; solar pumping depends on a sustainable water source and may not reduce water stress by itself. Repayment schedules aligned with crop cycles, guarantees, group lending, shared equipment, and extension support are potential design options. Their suitability and effects in Palestine require local evaluation (World Bank, 2023).

Credit may need to be paired with crop-specific technical advice, climate information, understandable loan terms, and maintenance support. Women farmers, tenants, and operators of small or fragmented plots may face different access barriers. Monitoring should document who applies for and receives finance, which practices are funded, and whether adoption and outcomes are sustained (Abu-Alsoud et al., 2026; Casas et al., 2020).

Monitoring should use measurable indicators, such as water use, soil conditions, energy emissions, and exposure to climate shocks. It should also track possible adverse effects, including debt stress and pressure on groundwater. A product label alone is not evidence of environmental benefit.

8. Policy and Research implications

8.1 Financial product design

Public agencies and development partners could pilot products for irrigation efficiency, rainwater harvesting, soil management, resilient varieties, protected cultivation, and renewable energy. Each product should define eligible practices, estimated costs, repayment terms, and safeguards. Partial guarantees, blended finance, farmer groups, and extension partnerships may be tested where they fit local conditions (PMA, 2024; World Bank, 2023).

8.2 Extension and risk management

Agronomic advice and climate information can inform credit decisions and help determine whether a proposed investment fits a farm's water source, soil, and crop system. Where climate shocks cause substantial seasonal income variation, insurance or other risk-sharing arrangements could be evaluated. Digital support may widen access, with in-person services available where needed.

8.3 Monitoring and evaluation

A monitoring system could record agricultural finance by financed practice, district, farm size, decision-maker gender, and institution type. It should distinguish applications, approvals, disbursements, use of funds, continued adoption, and subsequent outcomes, including productivity, water use, income stability, and repayment performance.

8.4 Future empirical study

A future farmer-level study could draw a stratified sample from an appropriate census frame by governorate, farm size, crop, and water source. It should link finance terms and investment purpose to adoption history, extension access, climate exposure, and farm outcomes. Baseline and follow-up observations, a comparison group, and a pre-specified identification strategy would strengthen inference where feasible. Missing data, survey weights, uncertainty, and sensitivity analyses should be reported.

9. Limitations

This analysis combines secondary sources with different dates, geographic coverage, units, definitions, and sampling frames. In particular, the Hebron farmer survey is a local sample and is not shown to be nationally representative, while the financial-sector percentages refer to institutions. The sources cannot be pooled into a farmer-level regression. Accordingly, this paper does not estimate the direction, magnitude, or statistical significance of an effect of green-purpose finance on adoption.

The sources also use different definitions of green finance, climate-smart practices, traditional practices, climate perceptions, and willingness to adopt. These measures are not interchangeable. This synthesis preserves the source definitions and reports each indicator separately, but the variation limits direct comparison across sources.

Geographic and temporal coverage is uneven. Conditions differ between the West Bank and Gaza, and conflict since October 2023 has affected access to farmland, water, inputs, and markets, particularly in Gaza. Census and earlier survey indicators should not be assumed to describe current production conditions. Future research should define pre- and post-shock periods explicitly

and account for changes in access and data coverage (FAO, 2024; World Bank, 2023).

The evidence review is exploratory and purposeful rather than systematic. It may omit relevant studies, and its conclusions about financing mechanisms are drawn from published evidence rather than measured effects among Palestinian farmers. Publication and source-selection bias are therefore possible. The underlying farmer survey's ethics approval and consent procedures are not reported in the thesis materials reviewed here, which limits what can be stated about the original data collection.

10. Conclusion

The reviewed sources describe agricultural structure, farmer-reported practices and perceptions in a local Hebron sample, and financial-sector engagement with green-purpose activities. They do not show that access to such finance leads smallholder farmers in Palestine to adopt CSA practices. The paper's contribution is to clarify this evidence boundary and identify what linked data would be needed to test the relationship.

Future research should collect farmer-level data on finance type and terms, adoption by practice, extension access, climate exposure, land and water access, gender, farm characteristics, and outcomes over time. Until such evidence is available, the policy options discussed here should be treated as proposals for piloting and evaluation. Affordable products designed for local agronomic conditions, paired with technical guidance and monitoring, are plausible approaches for testing, not effects established by this analysis.

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