Bridging the Orchard-to-Market Gap: Infrastructure, Institutional Support and Horticultural Outcomes across Agro-Climatic Zones of Himachal Pradesh

by

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ABSTRACT

Himachal Pradesh has achieved a major transition towards high-value horticulture, yet higher production does not automatically generate stable farm income when perishable produce moves through uneven infrastructure and fragmented markets. This study examines how infrastructure and institutional support are associated with horticultural outcomes across the state's four agro-climatic zones. Primary evidence was obtained from 386 horticulturists selected through a multistage stratified design covering Kangra, Chamba, Shimla and Lahaul-Spiti districts. Descriptive statistics, Pearson correlation, one-way analysis of variance and beneficiary-non-beneficiary comparisons were used. Infrastructure recorded a moderate mean score (2.76 on a five-point scale), below the mean productivity score (3.42), indicating a persistent orchard-to-market gap. Infrastructure and productivity were strongly correlated ($r = 0.68$, 95% CI [0.62, 0.73], $p < 0.001$), with shared variance of 46.2%. Significant zonal differences occurred in infrastructure ($F = 6.84$, $p < 0.001$), productivity ($F = 5.92$, $p = 0.001$) and problem severity ($F = 7.36$, $p < 0.001$). Beneficiaries also reported higher productivity and income scores than non-beneficiaries. The findings support a shift from production-centred policy towards zone-sensitive value-chain development integrating farm access, aggregation, grading, packhouses, cold-chain facilities, processing, digital information and competitive marketing institutions. The study contributes farm-level, cross-zonal evidence while explicitly distinguishing statistical association from causal impact.

Keywords: horticultural infrastructure; value chain; market connectivity; agro-climatic zones; institutional support; Himachal Pradesh

1. Introduction

Horticulture has reshaped the agrarian economy of Himachal Pradesh by enabling cultivators to use small and fragmented holdings for relatively high-value production. Apples, stone fruits, citrus fruits, vegetables and other temperate or subtropical crops provide important income opportunities across sharply different elevations. This transformation, however, has also increased farmers' exposure to post-harvest and marketing risks. Fruits and vegetables are perishable, quality-sensitive and seasonal. Their value depends not only on what is produced in the orchard or field, but also on whether output can be assembled, graded, packed, stored, transported and sold at an appropriate time and destination.

The distinction between production and value realisation is especially important in a mountainous state. Dispersed settlements, difficult terrain, weather-related road disruption, small marketable surpluses and long distances from major consumption centres can raise transaction costs. When local aggregation, scientific grading, pre-cooling, storage or processing facilities are inadequate, farmers may have to sell quickly, accept lower prices or depend heavily on intermediaries. Even accurate price information has limited economic value if a cultivator lacks the physical and organisational capacity to reach a better market. Infrastructure must therefore be understood as a connected system rather than as an isolated road, irrigation channel, store or market yard.

Public policy has increasingly recognised this wider system. The Government of Himachal Pradesh has reported investments in wholesale markets, electronic market integration, grading, irrigation and post-harvest facilities (Government of Himachal Pradesh, 2025). The World Bank-supported horticulture programme similarly combined orchard renewal and irrigation with market infrastructure and institutional development (World Bank, 2024). Nevertheless, recent studies continue to identify transport cost, cold-storage shortages, price volatility, marketing margins and weak coordination as important constraints in the apple economy (Kumar et al., 2024; Kumar & Parmar, 2025; Mathur et al., 2025; Sharma et al., 2024). This apparent coexistence of expanding production and continuing value-chain friction motivates the present analysis.

Most available studies are concentrated in major apple-producing districts or examine a particular crop, marketing channel or technology. Such work is valuable but cannot fully capture the heterogeneity between low-hill, mid-hill, high-hill and cold-dry production systems. The same intervention may yield very different returns across zones. A packhouse may be pivotal in a concentrated apple belt, whereas first-mile road access, small aggregation points, irrigation reliability or locally appropriate processing may be more urgent elsewhere. Evidence covering all four zones is therefore necessary for prioritising scarce public investment.

This paper asks three related questions. First, how adequate are farmers' perceived infrastructure and institutional-support conditions relative to their reported productivity outcomes? Second, how strongly is infrastructure associated with productivity? Third, do infrastructure, productivity and problem severity differ across agro-climatic zones, and do beneficiaries of support programmes report better outcomes than non-beneficiaries? By answering these questions, the paper moves beyond a production-only narrative and develops an orchard-to-market interpretation of horticultural development. Its contribution is a balanced, farm-level comparison of four zones, an explicit account of effect magnitude in addition to statistical significance, and a policy framework linking physical infrastructure with collective and market institutions.

2. Literature Review and Analytical Perspective

The economic case for horticultural infrastructure begins with the special characteristics of high-value perishables. Unlike durable staples, fruits and vegetables can lose physical quality and market value rapidly after harvest. Timing, appearance, size, temperature management and handling practices influence the price received. The value chain therefore includes a sequence of interdependent functions: input and production support, harvesting, farm-level handling, aggregation, grading, packing, transport, storage, processing, wholesaling and retailing. Failure at one stage can reduce the return to investment at another stage.

Earlier evidence from Himachal Pradesh shows that farm and household characteristics, marketing arrangements and access to technology jointly shape outcomes. Kashyap and Guleria (2015) documented socio-economic and marketing conditions among apple growers in Mandi district. Sharma and Guleria (2020) reported marketing problems faced by apple producers and demonstrated the importance of channel choice. Samriti et al. (2021) examined the economics of apple cultivation in the high hills, while Kudamala et al. (2019) compared cultivators using and not using drip irrigation. Together, these studies indicate that orchard profitability is influenced by both production-side assets and the institutions through which output is marketed.

More recent research has shifted towards value-chain performance. Kumar et al. (2024) traced value addition and losses across apple marketing stages in Shimla. Sharma et al. (2024) found differences in marketing efficiency across channels and emphasised better logistics and infrastructure. Mathur et al. (2025) identified high transport cost, inadequate cold storage and price volatility as continuing weaknesses, and Kumar and Parmar (2025) highlighted the relevance of supply-chain management practices among growers. Doda et al. (2025) further showed that risk-management constraints remain material for apple farmers. This literature establishes a persuasive case for coordinated investment but remains geographically and crop-wise concentrated.

The present study uses a systems perspective. Infrastructure can influence productivity directly through irrigation, farm access, inputs and technical services, and indirectly by reducing post-harvest loss, improving input-output timing and increasing the expected return from better orchard management. Institutional support can complement infrastructure by reducing information gaps, enabling programme access and helping producers coordinate. Collective marketing through farmer organisations can lower per-unit transaction costs and increase bargaining capacity, but its effectiveness still depends on reliable logistics and transparent market relationships.

The analytical pathway is therefore expressed as: infrastructure and institutional support facilitate production and post-harvest capability; these capabilities improve quality preservation, market access and bargaining options; improved options raise the likelihood that physical output is converted into income. Agro-climatic location affects every link through elevation, crop mix, remoteness, road conditions and market distance. Beneficiary status may also be associated with better outcomes because schemes can relax capital, knowledge or coordination constraints. These mechanisms generate two testable null hypotheses: infrastructure has no statistically significant association with horticultural productivity; and mean infrastructure, productivity and problem-severity scores do not differ across agro-climatic zones. Beneficiary comparisons are treated as supplementary evidence rather than a causal test because programme participation is not randomly assigned.

This framework also clarifies why a simple production target is insufficient. A rise in output can depress local prices during peak arrivals if aggregation, storage, processing and market reach do not expand simultaneously. Conversely, market and post-harvest investments can increase realised value without necessarily increasing physical output, by reducing deterioration, improving grade composition or enabling delayed and spatially wider sales. The relevant policy objective is consequently not maximum production alone, but resilient value realisation per unit of farm resources.

3. Materials and Methods

The study is based on a cross-sectional primary survey of 386 horticulturists. A multistage stratified sampling design was used to represent Himachal Pradesh's four agro-climatic zones. One district was selected from each zone: Kangra for the low-hill zone, Chamba for the mid-hill zone, Shimla for the high-hill zone and Lahaul-Spiti for the cold-dry zone. Subsequent stages covered blocks, villages and horticultural households. Near-equal allocation produced 97 respondents each in Kangra and Chamba and 96 each in Shimla and Lahaul-Spiti. The balanced structure prevents the largest production region from numerically dominating the comparison and makes cross-zone contrasts easier to interpret.

The survey schedule captured respondents' assessments of horticultural productivity, enabling infrastructure, government or institutional support, constraints and income-related outcomes. Composite indicators were recorded on a five-point scale, with higher scores indicating a stronger level of the named construct; for problem severity, a higher score indicates more severe constraints. Infrastructure was treated broadly enough to reflect the enabling environment relevant to farm production and movement towards markets. The paper retains the composite measures because the available analysis concerns overall infrastructural adequacy rather than the isolated contribution of a single facility.

Four analytical procedures were applied. First, means and standard deviations describe the level and dispersion of major indicators. A mean close to the scale midpoint indicates moderate rather than universally adequate conditions. Second, Pearson's product-moment correlation measures the direction and strength of the linear association between infrastructure and productivity. The squared correlation is reported to convey shared variance, and a Fisher transformation is used to obtain the 95% confidence interval. Third, one-way analysis of variance tests whether zone means are equal. With four groups and 386 observations, the test has 3 between-group and 382 within-group degrees of freedom. In addition to F-statistics and p-values, eta-squared is derived as $\eta^2 = (df\_between \times F)/[(df\_between \times F) + df\_within]$, providing an interpretable measure of the share of indicator variance associated with zone membership. Fourth, independent-group t-tests compare reported productivity and income outcomes of beneficiaries and non-beneficiaries.

The analysis uses a 5% significance threshold while also reporting exact or bounded p-values and effect magnitudes. Statistical significance is not interpreted as causation. Correlation cannot establish whether infrastructure raises productivity, whether more productive farmers gain better access, or whether both reflect income, crop choice, location or other factors. Similarly, beneficiaries may differ systematically from non-beneficiaries in landholding, information, initiative or programme eligibility. The design is therefore appropriate for identifying robust associations and spatial differentiation, but not for estimating treatment effects.

Three further limitations define the scope of inference. The indicators are perception-based composites and may contain response or recall error. A single cross-section cannot capture seasonal shocks or the lag between infrastructure investment and orchard returns. Finally, selection of one representative district per zone improves feasibility and coverage but does not make each district statistically representative of every locality in its zone. These limitations are addressed through cautious interpretation and by using the results to identify policy priorities and future research needs rather than to claim a definitive causal ranking of projects.

Table 1. Distribution of the Sample by Agro-Climatic Zone

Agro-climatic zone	Selected district	Respondents
Low Hill	Kangra	97
Mid Hill	Chamba	97
High Hill	Shimla	96
Cold Dry	Lahaul-Spiti	96
Total	—	386

Note. Near-equal allocation was used for comparative analysis across zones.

4. Results

The descriptive evidence reveals an imbalance between farm outcomes and their enabling environment. Mean reported productivity was 3.42 with a standard deviation of 0.84, whereas infrastructure averaged 2.76 with a standard deviation of 0.91. Government support recorded the lowest mean, 2.58, with a standard deviation of 0.87. On a five-point scale, infrastructure and support therefore remained below the neutral midpoint even though productivity was assessed more favourably. Dispersion was also substantial: the infrastructure standard deviation was approximately one-third of its mean, indicating that the average conceals meaningful variation across farms and locations.

This pattern is the empirical expression of the orchard-to-market gap. Farmers appear capable of generating output under existing conditions, but the systems required to sustain, handle and commercialise that output are less developed. The relatively low support score suggests that physical investment alone is unlikely to close the gap. Information, extension, organisational capability, scheme access and market facilitation are necessary complements. An unused cold store, poorly connected market yard or digital platform without aggregation and transport would have limited effect.

The infrastructure-productivity correlation was 0.68, indicating a strong positive relationship. With 386 observations, the estimated 95% confidence interval extends from approximately 0.62 to 0.73, and the association is statistically significant at $p < 0.001$. Squaring the coefficient gives 0.462, meaning that infrastructure and productivity share about 46.2% of their observed variance. This is not the proportion of productivity causally created by infrastructure; it is a measure of bivariate overlap. Even with that qualification, the magnitude is economically meaningful and leads to rejection of the first null hypothesis.

The association is consistent with several complementary mechanisms. Better irrigation and access roads can improve timeliness of farm operations. Grading and packing can protect quality and differentiate output. Storage and processing can reduce the pressure to sell immediately, while reliable transport widens the feasible market set. Stronger market connectivity can also change production incentives because farmers are more likely to invest in quality when they expect quality to be recognised and rewarded. The correlation summarises the combined operation of these channels, not the isolated return to any one asset.

One-way ANOVA rejects equality of zone means for all three tested indicators. Infrastructure differs significantly across zones ($F[3, 382] = 6.84$, $p < 0.001$). The derived eta-squared is 0.051, so zone membership is associated with about 5.1% of the observed variation in infrastructure scores. Productivity also differs ($F[3, 382] = 5.92$, $p = 0.001$; $\eta^2 = 0.044$). The strongest zonal differentiation occurs in problem severity ($F[3, 382] = 7.36$, $p < 0.001$; $\eta^2 = 0.055$). These are modest but policy-relevant effects. They show that within-zone heterogeneity remains large, yet the zone itself systematically matters.

The second null hypothesis is therefore rejected. A state-wide average is not an adequate basis for allocating every category of investment. The high-hill apple economy, for example, may require sophisticated grading, packing, cold-chain and long-distance logistics, while a remote cold-dry location may attach greater value to dependable first-mile connectivity, aggregation and weather-resilient storage. In lower or mid-hill mixed-horticulture systems, smaller decentralised facilities, irrigation reliability, local processing or market coordination may be more appropriate. The statistical test does not identify the exact priority within each zone, because post-hoc means and facility-specific indicators are not available in the reported dataset; it does establish that identical treatment of all zones would ignore measurable spatial differences.

Supplementary comparisons reinforce this interpretation. Beneficiaries recorded a mean productivity score of 3.84 compared with 2.96 among non-beneficiaries; the difference was statistically significant ($t = 4.27$, $p < 0.001$). The corresponding income means were 3.69 and

2.88 (t = 3.91, p = 0.001). The gaps of 0.88 points for productivity and 0.81 points for income are large relative to a five-point response scale. They are compatible with the proposition that public or institutional support helps farmers overcome capital, information and coordination barriers.

These comparisons must nevertheless be interpreted carefully. Beneficiary status may be endogenous: better-connected or more commercially oriented farmers may be more likely both to join a programme and to report stronger outcomes. Without baseline observations, matching, an instrument or random assignment, the t-tests cannot isolate programme impact. Their proper role is diagnostic. They indicate that support access and outcomes move together and justify more rigorous scheme-level evaluation.

Table 2. Descriptive Statistics for Core Study Indicators

Indicator	Mean	Standard deviation
Productivity	3.42	0.84
Infrastructure	2.76	0.91
Government/institutional support	2.58	0.87

Note. Indicators are measured on five-point composite scales; higher values indicate more of the named construct.

Table 3. Association between Infrastructure and Productivity

Relationship	r	95% CI	Shared variance (r^2)	p
Infrastructure × productivity	0.68	[0.62, 0.73]	46.2%	< 0.001

Note. The confidence interval is derived using Fisher's r-to-z transformation (N = 386). Shared variance is descriptive and should not be interpreted as a causal effect.

Table 4. One-Way ANOVA of Inter-Zonal Differences

Indicator	F(3, 382)	p	η^2
Infrastructure	6.84	< 0.001	0.051
Productivity	5.92	0.001	0.044
Problem severity	7.36	< 0.001	0.055

Note. Eta-squared values were derived from the reported F-statistics and degrees of freedom.

Table 5. Beneficiary and Non-Beneficiary Outcome Comparisons

Outcome	Beneficiary mean	Non-beneficiary mean	Mean gap	t	p
Productivity	3.84	2.96	0.88	4.27	< 0.001
Income	3.69	2.88	0.81	3.91	0.001

Note. Mean gaps are beneficiary minus non-beneficiary scores. Group sizes were not available in the summary output; effect sizes are therefore not estimated.

5. Discussion

The findings connect farm-level perceptions with the emerging literature on value-chain inefficiency in Himachal Pradesh. Studies of apple marketing have repeatedly shown that channel structure, transport, handling, storage and intermediary arrangements influence the producer's share and marketing efficiency (Kumar et al., 2024; Mathur et al., 2025; Sharma & Guleria, 2020; Sharma et al., 2024). The present analysis adds a broader geographic result:

infrastructure is strongly associated with productivity across a balanced sample spanning all four agro-climatic zones, and the constraints are not spatially uniform.

The infrastructure mean below the scale midpoint is particularly important because it appears alongside a productivity mean above the midpoint. This combination suggests that horticultural households may be compensating for system deficiencies through private effort, rapid sale or reliance on established intermediaries. Such adaptation can keep output moving but may transfer risk and bargaining power away from the producer. It can also make farm income more volatile when roads are disrupted, markets are congested or prices fall at peak harvest. An apparently functional chain may therefore remain inefficient and unequal.

The result also cautions against treating digital marketing as a substitute for physical infrastructure. Electronic price discovery and market integration can improve transparency, but a quoted price becomes actionable only when produce can be assembled, graded, transported and delivered at acceptable cost. Digital and physical connectivity are complements. The same complementarity applies to Farmer Producer Organisations. Collective action may pool output and improve bargaining, yet an organisation without professional management, working capital, quality protocols and dependable logistics may not deliver sustained benefits.

Zonal effects deepen this argument. Agro-climatic classification is not merely biological; it is also an economic geography of crop choice, seasonality, accessibility and market distance. A zone-sensitive strategy should begin with value-chain mapping at cluster level: identify major crops, harvest windows, volumes, road bottlenecks, current channels, loss points and feasible buyers. Investment should then address the binding constraint rather than reproduce the same facility everywhere. This approach would reduce the risk of low-capacity utilisation and improve the fit between public assets and commercial demand.

The beneficiary advantage is consistent with diffusion theory, under which awareness, trialability, institutional contact and peer networks affect adoption (Rogers, 2003). Yet the study's non-experimental design also highlights a governance question: are programmes reaching farmers with the largest constraints or those already best positioned to participate? Future evaluations should measure both average effects and distributional reach, including smallholders, remote villages, women cultivators and newer crop clusters. Programme success should be judged by additional income, reduced loss, improved price realisation and resilience, not simply by the number of assets installed or beneficiaries enrolled.

The study's principal scholarly contribution lies in reframing infrastructure as a conversion mechanism between production and realised economic value. The strong correlation does not prove causality, but its magnitude, the zonal ANOVA results and the beneficiary gaps form a coherent pattern. Production capability, spatial context and institutional access jointly shape horticultural outcomes. This integrated interpretation advances beyond district-specific marketing descriptions while remaining grounded in what the cross-sectional evidence can legitimately support.

6. Policy Implications

The first priority is to plan infrastructure as a corridor from orchard to market. Farm and link roads, collection points, grading lines, packhouses, pre-cooling, cold storage, refrigerated or protected transport, processing facilities and wholesale markets should be sequenced around crop clusters and harvest volumes. Project appraisal should test whether each facility has reliable supply, power, water, management and buyer linkages. Capital expenditure without an operating model is unlikely to create durable value.

Second, investment should be differentiated by zone and cluster. The significant zonal effects justify separate infrastructure-gap assessments rather than a uniform state package. Planning units should combine agro-climatic conditions with travel time, road reliability, crop mix, marketed surplus and distance from existing facilities. Small decentralised assets may outperform large central facilities in dispersed areas, whereas high-volume clusters may support specialised grading, controlled-atmosphere storage and processing.

Third, producer aggregation should be treated as economic infrastructure. Farmer Producer Organisations, cooperatives and cluster groups can consolidate small lots, standardise grades, negotiate transport, obtain working capital and contract with institutional buyers. Support must extend beyond registration to professional management, transparent accounting, market intelligence and enforceable quality rules. Public agencies can facilitate initial coordination while preserving commercial discipline.

Fourth, market information should be integrated with transaction capability. Farmers need timely prices, demand and quality specifications, but also access to assaying, logistics, dispute resolution and payment assurance. Electronic platforms and e-NAM-linked markets will be more effective when they are connected to local collection and interoperable grading standards. Monitoring should record actual farmer sales and price outcomes rather than only digital enrolment.

Fifth, processing should be used strategically to absorb lower grades and stabilise seasonal gluts. Juice, pulp, drying, pickling and other crop-appropriate processing can reduce waste, but plant location and scale must follow realistic raw-material and market assessments. Links with private buyers, hospitality, retail and institutional procurement can broaden demand. Waste and by-product utilisation should be incorporated where commercially feasible.

Finally, evaluation must improve. Future programme data should record baseline conditions, farmer characteristics, facility use, marketed quantity, grades, losses, prices, costs and net income. Phased rollout can support quasi-experimental evaluation. Geotagged infrastructure and travel-time mapping would help identify underserved clusters and duplication. These changes would allow policy to move from counting facilities to measuring whether they reduce the orchard-to-market gap.

7. Conclusion and Future Research

Himachal Pradesh's next horticultural transition must focus on value realisation as much as production. In the present sample, infrastructure and institutional-support scores lag behind productivity, infrastructure has a strong positive association with productivity, and infrastructure, productivity and problem severity differ significantly across agro-climatic zones. Beneficiaries report stronger productivity and income outcomes, although selection prevents a causal interpretation. Taken together, the results reject a uniform, production-centred approach.

The appropriate alternative is a zone-sensitive value-chain strategy that connects farm access and irrigation with aggregation, grading, packing, cold-chain management, processing, transparent markets and capable producer organisations. Digital information should complement rather than substitute for physical logistics. Public investment should be guided by crop-cluster volumes, binding constraints and measurable effects on loss, price realisation, cost and net income.

Future research should construct facility-specific indices, report zone-wise means and post-hoc contrasts, and link perception scores with objective measures such as travel time, distance, storage capacity, marketed surplus, realised price and post-harvest loss. Panel data would reveal how infrastructure affects outcomes over time. Programme evaluation using matching, difference-in-differences or phased implementation would provide stronger causal evidence. Crop-specific value-chain mapping could then translate the broad zonal findings into bankable project priorities. The current study provides the comparative foundation for that agenda while demonstrating that the economic success of horticulture is determined not only in the orchard, but along the entire route to market.

References

Doda, H., Chaudhary, R., Singh, A., Sharma, A., & Thakur, P. (2025). Exploring constraints in risk management practices: A study of apple growers in Himachal Pradesh, India. Economic Affairs, 70(1), 121–129. https://doi.org/10.46852/0424-2513.1.2025.16

Government of Himachal Pradesh. (2025). Economic Survey of Himachal Pradesh 2024–25. Department of Economics and Statistics.

Kashyap, R., & Guleria, A. (2015). Socio-economic and marketing analysis of apple growers in Mandi district of Himachal Pradesh. Journal of Hill Agriculture, 6(2), 202–206. https://doi.org/10.5958/2230-7338.2015.00044.0

Kudamala, S., Sharma, S., & Guleria, A. (2019). Socio-economic characteristics and problems faced by apple cultivators under with drip and without drip irrigation system. Economic Affairs, 64(2), 451–457. https://doi.org/10.30954/0424-2513.2.2019.22

Kumar, A., & Parmar, J. S. (2025). Supply chain management practices among apple growers of Shimla district in Himachal Pradesh. Bhartiya Krishi Anusandhan Patrika, 40(3–4), 326–334. https://doi.org/10.18805/BKAP867

Kumar, A., Sharma, M., Guleria, C., & Yadav, N. (2024). Value chain analysis of apple in Shimla district of Himachal Pradesh, India. Journal of Scientific Research and Reports, 30(11), 166–175. https://doi.org/10.9734/jsrr/2024/v30i112544

Mathur, S., Deekshith, M., & Chaitra, G. B. (2025). Marketing strategy for apple value chain: A case of Himachal Pradesh. Journal of Farm Sciences, 38(2), 174–176. https://doi.org/10.61475/JFS.2025.v38i2.17

Rogers, E. M. (2003). Diffusion of innovations (5th ed.). Free Press.

Samriti, Sharma, R., Dev, K., Pathania, A., & Sharma, S. (2021). An economic analysis of apple cultivation in high hills of Himachal Pradesh. Economic Affairs, 66(2), 265–270.

Sharma, I., & Guleria, A. (2020). Economics of marketing of apple crop and the problems faced by growers in Himachal Pradesh. Economic Affairs, 65(2), 285–293. https://doi.org/10.46852/0424-2513.2.2020.22

Sharma, S., Patel, D. B., & Panigrahy, S. (2024). Marketing efficiency of apple in Shimla district of Himachal Pradesh, India. Journal of Experimental Agriculture International, 46(12), 512–518. https://doi.org/10.9734/jeai/2024/v46i123157

World Bank. (2024). Boosting apple cultivation in Himachal Pradesh. World Bank.