

RESEARCH ARTICLE

Issues and challenges faced by the kiwifruit growers in Phek district of Nagaland

Sesoteü Mero¹, Deepa Thangjam^{2*}, Mary N. Odyuo³, K.K. Jha⁴, Animesh Sarkar⁵

Abstract

Kiwi is one of the focus horticultural crops of Nagaland. The fruit is commercially grown in districts like Phek, Kohima and Zunheboto. The varieties grown are Hayward, Allison and Bruno. Phek district covered the largest area of cultivation with 109.00 ha in the year 2020-2021 in Nagaland. Yet, with so much potential and future prospects, the farmers faced challenges and issues in their farming. Therefore, the present study was conducted with the aim of ranking different problems faced by the farmers in Phek district, Nagaland, with a total of 120 respondents. Information regarding their problems is procured from the farmers through a structured interview schedule. To find out the most important problems faced by the respondents, Garrett's ranking techniques were used, which convert the order of problems into numerical scores. The study concluded that 'lack of irrigation facilities' was the main problem faced by the respondent with the highest Garrett score of 8385 and an average score of 69.87%, followed by lack of storage facility (62.87%), lack of tools, equipment, machinery, etc (57.99%), Inadequate farm credit (55.10%), pest and disease problem (50.30%), shortage of labour (49.42%), marketing problem (44.95%), high cost of investment (39.06%) and lack of adequate transportation facilities (30.32%).

Keywords: Irrigation, Kiwi, farming, Garrett ranking, problems

Introduction

Kiwi (*Actinidia deliciosa*) is popularly known as China's miracle fruit and the horticultural wonder of New Zealand, belonging to the family Actinidiaceae. Kiwi fruit is a berry that is also known as the Chinese gooseberry. It is native to China and its taste is described as sweet and tart flavour just like gooseberry. This fruit was brought to New Zealand from China in the early 20th century by the missionaries. Its name is derived from the native birth of the New Zealand "Kiwi". Species *deliciosa* is the most common variety found, which is also known as Hayward kiwi. It is declared as the national fruit of China, but the *Actinidia* genus is native to India, Japan and Chile. The largest producers of this fruit are Italy, Japan and Chile (Mishra *et al.* 2014). According to FAOSTAT (2024), the top 10 kiwi producers in the world are China, Italy, New Zealand, Iran, Chile, Greece, France, Japan, Türkiye and the United States of America. In India, kiwi is mostly grown in the mid-hills of Himachal Pradesh, Uttar Pradesh, Jammu and Kashmir, Sikkim, Meghalaya, Arunachal Pradesh and Kerala (<http://nhb.gov.in>). This crop bears a highly respiratory climacteric type of fruit and can be stored for around 3 to 4 months under optimum storage environment, having high relative humidity (90–95%) and a temperature of -5 to 0°C. The fruit of the kiwi is rusty brown with a hairy surface, the flesh is light green with a decorative pattern of light-coloured rays radiating from the centre and embedded with small, soft and dark seeds (Raja *et al.* 2021). According to Richardson *et al.* (2018), Kiwi fruit is a natural

whole fruit that is considered a highly nutritious fruit as it has a high amount of vitamin C, and low energy fruit. They also reported in their study that kiwifruit is also beneficial for gastrointestinal function in healthy individuals as well as

¹PG Scholar, School of Agricultural Sciences, Nagaland University, Medziphema campus-797106, Nagaland, India.

^{2*}Assistant Professor, Department of Rural Development and Planning, School of Agricultural Sciences, Nagaland University, Medziphema campus-797106, Nagaland, India.

³Associate Professor, Department of Agricultural Extension, School of Agricultural Sciences, Nagaland University, Medziphema campus-797106, Nagaland, India.

⁴Professor, Department of Agricultural Extension, School of Agricultural Sciences, Nagaland University, Medziphema campus-797106, Nagaland, India.

⁵Associate Professor, Department of Horticulture, School of Agricultural Sciences, Nagaland University, Medziphema campus-797106, Nagaland, India.

***Corresponding Author:** Deepa Thangjam, Department of Rural Development and Planning, School of Agricultural Sciences, Nagaland University, Medziphema campus-797106 India, E-Mail: deepa@nagalanduniversity.ac.in

How to cite this article: Mero, S. Thangjam, D. Odyuo, M.N. Jha, K.K. Sarkar, A. 2025. Issues and challenges faced by the kiwifruit growers in Phek district of Nagaland. *Indian J. Hill Farm.*, 38(1):39-44.

Source of support: Nil

Conflict of interest: None.

Received: 02/07/2024 **Revised:** 31/01/2025 **Accepted:** 01/09/2025

in individuals with constipation and other gastrointestinal disorders.

Kiwifruit has a great potential for profitability, but with a lack of quality sapling, male and female plant management in the field, lack of modified storage and refrigerator van were major constraints in Ilam municipality, while lack of cemented support, pruning and training knowledge and poor road connectivity were major constraints in Sandakpur rural municipality (Giri *et al.* 2021). Kiwifruit has a bright prospect despite such potential lack of skilled labour, lack of awareness in cultural practices, especially in training and pruning, and also, pollination has hindered further higher returns. Marketing is also the main obstacle due to the non-availability of cold storage and processing units and other infrastructure for the promotion of the kiwifruit (Raja *et al.* 2021). Kiwifruit is one of the leading agricultural commodities having the potential for export to the international market. Even though possessing such advantages with inadequate scientific research on kiwifruit, lack of adoption of improved, insufficient investment, unstable prices and profit margin along with market channels have blockage to benefits. To fortify the kiwi subsector, recommending to focus on the strategy of improving productivity with conventional mechanisation, price intervention, market recognition, establishment of storage and processing centres and diplomatic relations for convenient global marketing (Sharma *et al.* 2020). Kiwi is one of the focus horticultural crops of Nagaland and is grown in an area of 500 ha. The fruit is commercially grown in districts like Phek, Kohima and Zunheboto. Out of all the districts in Nagaland, Phek district has 109.00 ha area under kiwi cultivation, which is the highest area under kiwi cultivation among all the districts in Nagaland (Directorate of Economics and Statistics, Nagaland, 2021). The varieties grown are Hayward, Allison and Bruno (CIH, Nagaland, 2022). Plantation of kiwi fruit started in the year 2001 in some districts of Nagaland and the people in the state are starting to notice the nutritional importance of the kiwi fruit crop and so the fruit crop is becoming popular among consumers in the state. The contribution of kiwi production from the state to India is 10.83% (<https://agriexchange.apeda.gov.in>, 2022). Despite having huge potential for returns, kiwi growers face many challenges, such as a lack of irrigation (Meena *et al.*, 2017), unavailability of proper storage (Rana *et al.*, 2022), lack of credit facility (Sharma *et al.*, 2020), lack of transportation facilities, etc. Therefore, to understand these challenges in the study area, the present study was conducted with the objective of identifying and ranking the issues and challenges faced by kiwi growers in the Phek district of Nagaland.

Methodology

The study was purposively carried out in Phek district as it has the largest area under kiwi cultivation among all the

districts in Nagaland. Out of a total of 110 villages in Phek district, six villages were selected randomly. From the six villages, 20 respondents were selected randomly from each village making a total of 120 respondents. The following are the list of villages and their GPS coordinates respectively:

- Zapami - 25.5358° N, 94.2462° E
- Porba - 25.6160° N, 94.3403° E
- Thipizu - 25.6287° N, 94.2653° E
- Rihuba - 25.6270° N, 94.2792° E
- Tsuphume - 25.5498° N, 94.3210° E
- Zelome - 25.5197° N, 94.3370° E

Primary data were collected directly from the farmers with the help of a structured interview schedule developed for this purpose. The data were collected from the respondents through a personal interview method using an interview schedule developed related to the problem faced by the kiwi growers. Farmers were asked to rank their problems based on the severity they faced in their experiences and accordingly that the order of constraints is arranged. Garret Ranking Techniques was applied for the study with the order of constraints in numerical scores (Ao and Jamir 2020).

Application of Garrett's Ranking Techniques

After a thorough review of literature and discussion with experts, the issues and challenges faced by the growers in kiwi cultivation were identified and ranked using Garrett's Ranking Techniques. The technique was used to rank the preferences mentioned by the respondents on different factors and aspects of the cultivation process. The study had respondents with different ranks of issues and challenges and thereby the outcome impact was converted into a score value and rank with the help of the formula:

Where, R_{ij} = Rank given for the i^{th} variable by j^{th} respondents

N_j = Number of variables ranked by j^{th} respondents

With the help of Garrett's Table, the percent position estimated is converted into a score Garrett and Woodworth, 1969). Then, for each factor, the scores of each individual are added and the total value of scores and the mean value of scores were calculated. The factors having the highest mean value were considered to be the most important factor. Below is the tabular representation of the problem faced by the kiwi-cultivating farmers in Phek district. The table is a random categorisation of the problems found during personal interviews. Table 1 showed the issues and challenges ranking faced by cultivators engaged in kiwi cultivation.

Result and Discussion

The Percent Positions and Garrett Values

The Garret ranks were calculated by using the appropriate Garret Ranking formula. Based on the Garret ranks, the Garret values were calculated. The Garret tables and scores

Table 1: Frequency of constraints based on kiwi cultivation given by respondents

Constraints	Ranks given by the respondents									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Lack of storage facility	49	4	24	4	4	3	21	4	4	3
Lack of irrigation facilities	21	18	24	18	30	1	2	3	1	2
Marketing problems	15	19	12	6	15	12	35	1	1	4
Lack of tools, equipment, machinery, etc	2	12	28	11	5	15	11	16	2	20
Shortage of labours	4	10	4	2	12	6	18	49	4	11
Inadequate farm credit	13	14	3	19	4	16	4	17	59	4
High cost of investment	5	15	1	1	5	2	1	8	23	39
Lack of adequate transport facilities	5	22	2	19	23	18	1	0	4	30
Grading problems	3	2	20	38	4	13	17	7	12	2
Pest and diseases	3	4	2	2	18	34	10	15	10	5

of each problem in the above table are multiplied by the record score in the next table. Finally, after adding each row, the total Garret score was obtained. The result is provided in the following Table 2.

Calculation of Garret Value and Ranking

The calculation of the Garret value and ranking of problems faced by kiwi growers are shown below in Table 3.

Issues and challenges in kiwi cultivation

Based on Garret's Ranking Techniques, from the above Table 3, it was found that 'lack of irrigation facilities' was the major problem with the highest Garret score of 8385 and an average score of 69.87%. 'Lack of storage facility' with a score of 7545 and an average score of 62.87% represented the second rank. The constraint 'lack of tools, equipment, machinery, etc' ranked third with a Garret score of 6959 with 57.99%. Further, these were followed by the constraints, viz. Inadequate farm credit, pest and disease problems, shortage of labour, grading problems, marketing problems, high cost of investment and lack of adequate transportation facilities.

Lack of irrigation facilities

Lack of proper irrigation facility was also found by Meena *et al.* (2017). According to the present study, irrigation has become one of the most important problems faced by the respondents. Phek district, being located in a hilly geographical location, water is inclined to flow to the lower plain area. The kiwi plant prefers steep terrace land preparation, in addition to the kiwi requires moist soil and continues irrigation (drip irrigation). Therefore, there hasn't been any establishment and investment of a water source unit, particular for kiwi farms in this area and so the absence of such support has become a major setback for the cultivators.

Lack of storage facility

The same problem of a lack of storage facility was also found by Rana *et al.* (2022). Kiwi is a temperate fruit and requires low chilling temperatures. Farmers in Phek district have not so far haven't adopted modified storage facilities or proper refrigerator containers. Though the production of kiwi is high, but to sell at the market and providing a periodical supply at market demand is hard due to no proper storage facilities and processing units. The fruits get rotten after being harvested or while left in the trees, which has led to great loss and damage to the farmers.

Lack of tools, equipment, machinery, etc

It was found that there was insufficient investment, with a lack of financial help and no credit assistance in the study area. Kiwi plants need regular weeding and proper pruning for their quality growth. For this, there are no high scientific tools, developed machinery adopted in their farms. The kiwi growers only used traditional tools like a regular dao,

Table 2: %Positions and Garret values

Sl. No.	Constraints	$100(R_{ij} - 0.5)/N_j$	Calculated value	Garret value
1	Lack of storage facility	$100(1-0.5)/10$	5	81
2	Lack of irrigation facilities	$100(2-0.5)/10$	15	70
3	Marketing problems	$100(3-0.5)/10$	25	63
4	Lack of tools, equipment, machinery, etc	$100(4-0.5)/10$	35	58
5	Shortage of labour	$100(5-0.5)/10$	45	52
6	Inadequate farm credit	$100(6-0.5)/10$	55	48
7	High cost of investment	$100(7-0.5)/10$	65	42
8	Lack of adequate transportation facilities	$100(8-0.5)/10$	75	37
9	Grading problems	$100(9-0.5)/10$	85	29
10	Pest and disease problems	$100(10-0.5)/10$	95	18

spade, furrows and an iron rod for weeding, earthing up the soil and pruning the plant, while they use tree branches for supporting the kiwi plant and a pergola for proper training. There isn't any electrical motor to irrigate the field, so such an issue has hindered the interest of the cultivators. This problem was also in a similar line to the constraints found by Jindal *et al.* (2021).

Inadequate farm credit

One of the major practices in kiwi cultivation is training and pruning. It needs a lot of initial investment to set up for operating training in the kiwi plant for support. While farmers are poor, financial assistance has become one of the barriers to harvesting higher returns from the farm. Similarly, Sharma *et al.* (2020) also found insufficient investment as a constraint in kiwi production. There is a lack of awareness and low exposure to schemes and other credit facilities offered by the centre and state. So, due to the ignorance of the farmer, they haven't availed such assistance or investment on their farms.

Pest and disease problems

The problems of pests and diseases were also found by Giri *et al.* (2021). In kiwifruit, no serious pest and disease attacks have been observed due to its hairy skin surface, but there are some confirmed insects infesting the fruits and leaves, and the roots of the plants get rotten. Insects like leafrollers and greenhouse thrips were confirmed, and crown rot disease were found to infest in kiwi fruit. Farmers used mechanical, cultural method and some ITK like putting ashes to bring down those pests. Blitox is one of chemical application used in kiwi farm to control diseases.

Shortage of labour

High labour charge and unavailability of trained labour were also found by Meena *et al.* (2017) and Jindal *et al.* (2021). Machineries are not widely adopted by rural household cultivators but require manpower. In today's generation,

people prefer to settle in urban areas for doing business and private jobs. These livelihood activities are increasing nowadays, which is inversely proportional to the labour required in the field and rural areas, so it has become difficult to find work force to be employed at the farms. With poor financial status of the cultivators to hire a labour and migration of people to urban areas for better living standard has become a loop hole for them.

Grading problems

Scientific policies regarding grading, trading, and quality standards are still lacking here. Khatri and Shrestha (2022) also reported post high post-harvest loss (20-30%) of fruits due to lack of proper harvesting, grading, storing, inappropriate packaging techniques and materials, and means of transportation. The kiwi growers do not follow any grading system, but depending on the size and weight, they supply at the market according to demand. As long as the amount of production is high, they have no issue selling off their harvest at the market or middleman at the fix price, which may be altered according to place and time. Proposing appropriate scientific policies and quality standards in kiwi production and marketing will assist the cultivators.

Marketing problems

Though the production of kiwi is high and at the same time demand from the consumer is also high, reaching the products at the right place with exact demand is poor due to a weak marketing channel and a poor marketing information system. Similar problems were also found by Rana *et al.* (2022). There is lack of knowledge on investors and inter-state marketing relation which failed the cultivators to identify the route to sell off their produce. There is need for establishing farmers association particularly on kiwi growers, setting up marketing sites and taking in trading expo to help farmers in getting connection with others in supplying their produce.

Table 3: Distribution of respondents based on the problem faced respondents (N=120)

Constraints	Ranks given by the respondents										Total	Percentage	Rank
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th			
Lack of irrigation facilities	1701	1260	1512	1044	1560	48	84	1111	29	36	8385	69.87	I
Lack of storage facility	3969	280	1512	232	208	144	882	148	116	54	7545	62.87	II
Lack of tools, equipment, machinery, etc	1053	980	189	1102	208	768	168	708	1711	72	6959	57.99	III
Inadequate farm credit	1215	1330	756	348	780	576	1470	37	29	72	6613	55.10	IV
Pest and Diseases problems	243	140	1260	2204	208	624	714	259	348	36	6036	50.30	V
Shortage of labour	405	1540	126	1102	1196	864	42	0	116	540	5931	49.42	VI
Grading problems	162	840	1764	638	260	720	462	592	58	360	5856	48.8	VII
Marketing problems	324	700	252	116	832	288	756	1813	116	198	5395	44.95	VIII
High cost of investment	243	280	126	116	936	1632	420	555	290	90	4688	39.06	IX
Lack of adequate transportation facilities	405	1050	63	58	260	96	42	296	667	702	3639	30.32	XI

High cost of investment

The initial investment required to start a kiwi farm is huge because it requires clearing land to set up the kiwi farms, purchasing genetically superior planting materials, hiring labourers, setting up poles for support, *etc.* Kiwifruit requires skeletal support for commercial production and so support frames like Kniffin, T-bar and pergola for vegetative growth are required for quality fruit. The development of proper packaging facilities and storage units demands a huge investment. To obtain such a result, adequate investment according to the strategic location needs to be made, but due to poor financial assistance, it stands as an obstacle to quality production and regular supplies at the market. A similar constraint was also found by Sharma *et al.* (2020).

Lack of adequate transportation facilities

Nagaland state is known for its poor road conditions and weak connectivity, which has become a major obstacle for the cultivators. Ao and Jamir (2020) conducted a study in Nagaland, and they found the same constraint. It becomes difficult for the farmers to dispatch their produce to various places because the study area is in landlocked areas where road is the only possible means for transportation and especially with the obstruction from weather conditions, there is furthermore more hindrance for traveling. There is limited movement of trucks and vehicles due to hesitation with the prevailing poor road conditions. With these challenges highlighting the issue at the National Highways and Public Work Department, the Government of Nagaland can mandate a vital route for the Phek district and the neighbouring district for the transportation of commodities, which can encourage the transport business much better between the dealers and producers.

Conclusion

The Garret ranking technique is a valuable tool for prioritizing and analysing constraints in various fields, including agriculture. When applied to identify and rank the constraints in kiwi cultivation in Phek district of Nagaland, the technique can provide significant insights into the challenges faced by farmers and stakeholders. The major constraints identified were Lack of irrigation facilities, Lack of storage facilities, Lack of tools, equipment, machinery, *etc.*, Inadequate farm credit, Pest and disease problems, Shortage of labour, Grading problems, Marketing problems, High cost of investment, and lack of adequate transportation facilities. There is a need for targeted training programs and extension services to enhance farmers' technical knowledge and skills in kiwi cultivation. This can be achieved through workshops, demonstration farms, and farmer field schools. Investment in infrastructure such as cold storage facilities, efficient transportation networks, and processing units is crucial. This will reduce post-harvest losses and improve market access. Strengthening market

linkages and providing market information can help farmers access better markets and fetch higher prices for their produce. Establishing cooperatives and farmer-producer organizations can facilitate collective marketing. Enhancing access to affordable credit and financial services will enable farmers to invest in essential inputs and technologies. Government schemes and subsidies should be made more accessible to Kiwi farmers. By implementing these measures, the kiwi cultivation sector in Nagaland can be revitalized, contributing to the overall economic development and livelihood enhancement of the region's farmers. Further, the present study has the following limitations, namely, limited geographical coverage, which makes it difficult to generalise findings for the entire state, a small sample size, which may not fully represent the diverse issues faced by all the kiwi growers, and resource and technological limitations, which may not cover all the advancements in kiwi farming. Therefore, in the future more there can be expansion of the study area, climate resilience study, deeper study on market value chain analysis, government policy assessment and livelihood studies on kiwi in the study area.

References

- Agri Exchange. 2022. India production of kiwi. https://agriexchange.apeda.gov.in/India%20Production/India_Productions.aspx?cat=fruit&hscode=1048. Accessed on 7th June 2023.
- Ao W. and Jamir K.B. 2020. Application of the Garrett ranking technique in studying the problems of bamboo cultivation: A case study of Mokokchung district, Nagaland. *Indian J. Hill Farming.*, 33(2): 311-315.
- Central Institute of Horticulture (CIH), Nagaland. 2022. Initiatives for market promotion of kiwi. <http://www.cihner.gov.in/index.php/marketing-agri-promotion/initiatives-inmarketpromotion-of-Kiwi>. Accessed on 7th June 2023.
- Directorate of Economics and Statistics. 2021. Nagaland statistical book. Directorate of economics and statistics. Nagaland, Kohima. pp- 45.
- FAOSTAT. 2024. FAOSTAT, Crops and Livestock Products. <https://www.fao.org/faostat/en/#data/QCL/visualize>. Accessed on 31st January, 2025.
- Garett H.E. and Woodworth R.S. 1969. Statistics in psychology and education. Vakils, Feffer and Simons Pvt. Ltd., Bombay. p.329.
- Giri M., Rawat G. and Sharma A. 2021. Constraints faced by the kiwi fruit farmers in Ilam municipality and Sandakpur rural municipality of Ilam district. *Food and Agribus. Manag.* 2(2):54-61. doi:org/10.26480/fabm.02.2021.54.61
- Jindal K.K., Sharma D.P. and Sharma L. 2021. Hi-Tech kiwi fruit production techniques in North West and North East Himalayan states. *Int. J. Trop. Agric.* 39(3): 277-283.
- Khatri S. and Shrestha S. 2022. Mechanization in fruit cultivation: Present status, issues, constraints and future aspects of Nepal. *Acta Mech. Malays.* 5(2): 35-43. doi: <http://doi.org/10.26480/amm.02.2022.35.43>.
- Meena R.R., Geanger K.L., Meena B.L., Bhatnagar P. and Meena P.L. 2017. Analysis of adoption and constraint perceived by respondents in Jhalawar district of Rajasthan state, India. *Int. J. Curr. Microbiol. Appl. Sci.* 6(4): 1465-1470
- Mishra L.M. and Shukla N.U. 2014. Kiwi: An organic fruit. *Popular Kheti.* 2(2)
- National Horticulture Board (NHB). 2023. Kiwi. <https://nhb.gov.in/model-project-reports/Horticulture%20Crops/Kiwi/Kiwi1.htm> Accessed on 2nd June 2023.
- Raja W.H., Noomphy M., Bam G., Nabi S.U., Sharma O.C., Mir J.I. and GS M. 2021. Potential and prospects of kiwifruit production in the state of Arunachal Pradesh. *The Pharma Innov. J.* 10(12): 1749-1751
- Rana P., Parihar P., Shah P. and Parihar N.S. 2022. A study on the socio-economic status and constraints faced by the mango growers in adoption of improved post-harvest management practices in Jammu district of Jammu and Kashmir. *The Pharma Innov. J.* 11(6): 2487-2493.
- Richardson D.P., Ansell J. and Drummond L.N. 2018. The nutritional and health attributes of kiwifruit: A review. *Eur. J. Nutr.* 57(8): 2659-2676. doi: 10.1007/s00394-018-1627-z
- Sharma A., Thapa S. and Khatiwada M.P. 2020. Production, marketing and future prospects of kiwifruit in Nepal. *Int. J. Appl. Sci. Biotechnol.* 8(2): 179-186