

## ADOPTION OF IMPROVED CULTIVATION PRACTICES OF GINGER (*Zingiber officinale* L.) IN TUENSANG DISTRICT, NAGALAND, INDIA

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### ABSTRACT

Ginger (*Zingiber officinale* L.) is an important spice crop of India and accounts for 45 % of the world's ginger production. In Nagaland State of India, the whole part of ginger plant is considered edible, from its green leaves to its flowers and rhizomes, everything is used as a food and medicine. There is a high potential for ginger farmers to get more economic returns with the right marketing platform and facilities. Therefore, the present study was conducted in Tuensang district, Nagaland, India in the year 2019, with an objective to understand the technological gap of farmers on ginger cultivation practices. Proportionate random sampling was used to constitute a sample size of 120 from four villages (Sangsangyu, Hakchang, Maksha and Kejok) under one block, namely, Sangsangyu RD block. Adoption on improved practices was based on the package of practices for ginger recommended by the District Horticulture office, Tuensang, Government of Nagaland and adoption index was developed to measure under 11 parameters. It was concluded that the adoption level was medium as most of the respondents were adopting the improved ginger cultivation 'partially'. It was also found that there was a huge prospect of ginger cultivation in the study area, however, the adoption was mostly partial, while in some of the practices, zero adoption was inferred which signifies a technological gap, reducing the productivity potential of the region, thus, more awareness may be created through extension approaches.

(Key words: Technological gap, adoption, recommended, practices, ginger, northeast)

### INTRODUCTION

Spices are high value and export oriented commodity crops, which play an important role in agricultural economy of the country and ginger (*Zingiber officinale* L.) is an herbaceous perennial crop which is consumed as an important spice ingredient in food for its aromata and unique pungency taste it brings to dishes and also used as a medicine for its medicinal properties. According to Bureau of Indian standards (BIS), there are 63 spices grown in India, ginger is one of the important spices of them and playing an important role in production and export of the country and is the highest producer of ginger in the world. Ginger (*Zingiber officinale* L.) is an important spice crop of India and accounts for 45 % of the world's ginger production. "Area under cultivation in India is about 63,000 ha with total production of about 2 lakh tones. The average productivity is about 3 tones ha<sup>-1</sup> (Meyase *et al.*, 2019). More than 50% of all this ginger production comes from West Bengal, Uttarakhhand, and Northeastern region" (Anonymous, 2022). As of 2020, the highest producing state of ginger in India is Madhya Pradesh accounting for more than 22.29% of the total ginger production in India followed by Karnataka with 15.08% and Assam at 9.94% (Anonymous, 2020).

The North Eastern region of India comprising the Indian States of Nagaland, Arunachal Pradesh, Mizoram, Manipur, Assam, Sikkim, Meghalaya and Tripura are immensely blessed with suitable climate and soil. "About 3 lakhs tones of ginger is being produced annually from 47,641 ha land and the northeast region is emerging as India's organic ginger hub" (Rahman *et al.*, 2009). This region is one among the highest ginger productivity zone in the world. The ginger of the region is known for its quality (less fibre). "Ginger produced from Northeastern states are reported to have higher oil and oleoresin content than ginger from other parts of the country. Cultivars suitable for NEH Region are Nadia, Maran, China, Varada, Himgiri, Mahima, Gorubathane, Rajetha and Rio-de-Janeiro" (Anonymous, 2013). It is observed that many farmers from North East region depend on ginger cultivation for livelihood and three new species have been discovered from the region. "Among all spices, ginger is the main cash crop supporting the livelihood and improving the economic level of many ginger growers of north eastern region". "Ginger is grown in almost all the states of the region but the leading states are Meghalaya, Mizoram, Arunachal Pradesh and Sikkim" (Sheo Govind *et al.*, 1998).

Tuensang is one of the most neglected and under developed region located 234 km away from the State

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Capital, Kohima district. Farming is their major source of livelihood and it is blessed with fertile soil and climatic conditions favourable for ginger cultivation. Farmers in Tuensang are taking up ginger and cardamom cultivation for alternate and additional income generation. Large plot of lands are been dedicated to cultivating the two crops and are marketed to Assam and other places. "*Hedychium chingmeianum* is the species discovered in Tuensang district by Botanical Survey of India" (Singh, 2019). Ginger is cultivated in the *Jhum* fields on a large scale whereby, farmers rely solely on organic inputs, local resources and practices for traditional methods of cultivation. It is purely cultivated organically as an inter crop or mixed crop with other crops. Generally farmers prefer mono cropping of ginger. However, they also practice mixed cropping with maize, chili, soybean, brinjal, papaya, cucumber, pumpkin, yam, tree tomato, tapioca and different types of leguminous crops in *jhum* is also done. Among other varieties of ginger, "the local intermediate sized varieties are also grown in bigger area in the region even though Nadia is common amongst the farmers on productivity view point" (Jha and Deka, 2008).

In Nagaland state, the whole part of ginger plant is edible from its green leaves to its flowers and rhizomes, everything is used as a food and medicine. In 2017, the Eleutheros Christian Society (ECS) had sold 730 tons of ginger produced in Tuensang district alone, within two days, through an e-auction at a transactional value of over Rs. 40 lakhs. This proves that there is a high potential for ginger farmers to get more economic returns with the right marketing platform and facilities. Therefore, looking into all the potentialities of ginger farming in Tuensang area of Nagaland the present study was conducted entitled "Adoption of improved cultivation practices of ginger (*Zingiber Officinale* L.) in Tuensang district, Nagaland, India with an objective to understand the technological gap of farmers on ginger cultivation practices.

## MATERIALS AND METHODS

The study was conducted in Tuensang district of Nagaland in the year 2019. Nagaland is the 16<sup>th</sup> state of India. The respondents were selected based on proportionate random sampling to constitute a sample size of 120 from four villages (Sangsangyu, Hakchang, Maksha and Kejok) under one block, namely, Sangsangyu RD block of Tuensang district, Nagaland, India. A total of 11 parameters extracted from the package of practices for ginger recommended by the district Horticulture office, Tuensang, Government of Nagaland, were considered and administered to the respondents. The responses elicited from the respondents were quantified as full adoption, partial adoption and non adoption of the recommended practices. For full adoption a Score of (2), for partial adoption (1) and for non adoption (0) were given. Following method was adopted to develop adoption index for measuring the extent of adoption.

Adoption index (AI) =  $\frac{\text{Total score obtained by there respondents}}{\text{Maximum possible score}} \times 100$

Based on of the extent of adoption, the respondents were classified into three categories as – low adoption level, medium adoption level and high adoption level.

## RESULTS AND DISCUSSION

Table 1 shows the level of adoption of recommended practices in ginger cultivation and the following points explain the findings regarding adoption.

### i. Varieties

According to findings 80 per cent of the respondents had partially adopted the recommended varieties while 20 per cent of the respondents had never adopted the recommended practices. The reason why the farmers adopted the recommended varieties only partially was due to fertile soil and good climatic conditions suitable for ginger in the study area.

### ii. Land preparation

It was observed that 53.33 per cent of the respondent had partially adopted the land preparation while 46.67 per cent of the respondents had never adopted the recommended method of land preparation because they find their traditional method easier than the recommended practices.

### iii. Propagation method

It was found that 92.5 per cent of the respondents had partially adopted the recommended method propagation while 7.5 per cent of the respondents had never adopted the propagation method.

### iv. Planting time

It was found that 73.32 per cent of the respondents had partially adopted that recommended planting time while 26.67 per cent because although they knew the planting time for ginger they planted depending on the first shower.

### v. Spacing

It was found that none of the respondents adopted the recommended practices for spacing because they perceived that close spacing would prevent the loss of crops if in any case the crop gets infected with diseases and pest and also for the reason that it would be easier to pull out affected plant along with the soil. These reasons were similar to the findings of Miso *et al.* (2020) where it was reported that because "they apprehend that closed spacing it would prevent the crop loss in such a way that if one plant caught infect then it could be pulled out before disease infestation".

### vi. Seed rate

It was observed that none of the respondents adopted the recommended seed rate because of lack of knowledge and the recommended seed rate for ginger was lesser than the regular size of seed rhizome that the farmers used. This was similar to the findings reported by Miso *et*

*al.* (2020) where none of the respondents had adopted seed treatment because of lack of knowledge.

#### **vii. Manuring**

It was observed that only 12.33 per cent of the respondents had partially adopted the recommended practices for manure, while 86.67 per cent of the respondents had never adopted it. The reason for the non adoption was because they lack knowledge about the importance of applying manures therefore ginger cultivation is organic by default in the study area which is similar to the findings of Yadav *et al.* (2004), who reported that, "the ginger production in the north eastern region is organic by default because the farmers of the region neither apply the chemical fertilizers nor chemical pesticides in ginger crop". However, application of manure will enhance the productivity of ginger as concluded by Ezung *et al.* (2020), where it was found that, "application of vermin-compost in greengram not only increased the yield but enhanced the productivity of the system and maintained the sustainability of the soil".

#### **viii. Irrigation and water management**

It was found that none of the respondents had adopted the recommended practices for irrigation because the farmers depend mostly on rain for irrigation and also because of their poor financial condition they cannot manage proper irrigation facilities in their farm.

#### **ix. Intercultural operations**

It was found that 62.5 per cent of the respondents had partially adopted the recommended practices for intercultural operations. The reasons were because they were more comfortable with their traditional way of doing it than the recommended practices.

#### **x. Harvesting time**

It was found that 45 per cent of the respondent of the respondent had fully adopted the recommended harvesting time, followed by 60 per cent of the respondents had partially adopted the recommended time for harvesting while only 5 per cent of the respondent had not adopted the recommended time for harvesting .

#### **xi. Disease and pest**

It was found that none of the respondents had adopted the recommended management for disease and pest because of their lack of knowledge about the pesticides dose required for the crops. However, the awareness on the benefits of organic management practices can be created to get more return from the field as reported by Behera *et al.* (2018) that, "the use of organic fungicides in ginger field

has shown its long term effects due to establishment of rhizospheric competent strains and mycoparasitism".

#### **2. Overall adoption level of ginger cultivation practices**

To measure the adoption level of the respondents, adoption index was developed. The category made was low, medium and high based on the mean and standard deviation. Table 2 revealed that 77.50 per cent of the total respondents had medium overall adoption level, after that 16.67 per cent having low adoption level and only 8.33 per cent had high level adoption level. An overall adoption index of the respondents about the different aspects of recommended practices of ginger cultivation was 77.50 per cent. Thus, it can be concluded that the adoption of improved practices in the study area was medium as most of the respondents were adopting the improved ginger cultivation partially. The findings were similar to the results of Jakkawad *et al.* (2006), who reported that majority (67.50%) of ginger growers were having medium level of adoption.

Based on the recommended cultivation practices, it can be concluded from the study that majority (70-90%) of the respondents had partial adoption of the recommended varieties, land preparation, propagation method, planting time, recommended intercultural operations and recommended time for harvesting. It was also found that, none of the farmers had adopted recommended spacing, seed rate, irrigation and water management, diseases and pest management. However, it can be concluded that the adoption of improved practices in the study area was medium as most of the respondents were adopting the improved ginger cultivation partially.

The ginger production in the study area is organic by default because the farmers of the region neither apply the chemical fertilizers nor chemical pesticides in ginger crop. Even if applied, it was found that they used the locally available farmyard manures (cowdung, pig manure, poultry manures, rabbit manure, etc.) by 14 per cent of the respondents. Thus, the soil was fertile enough to give them good return, therefore, the authors would like to opine that, respondents ignorance on the use of chemical fertilizers is turning out to be in favour of sustainable farming and therefore organic farming of ginger *per-se* need to be maintained and encouraged further.

From the study it was found that there was a huge prospect of ginger cultivation in the region, however, the adoption was mostly partial, while in some of the practices, zero adoption was inferred which signifies a technological gap, reducing the productivity potential of the region, thus, more awareness may be created through extension approaches.

**Table 1. Distribution of respondents based on their adoption level of farmers about improved ginger cultivation practices N-120**

Sr. No.	Improved Practices	Extent of adoption						Mean Adoption Score
		Full		Partial		Nil		
		F	P	F	p	F	p	
1.	Varieties	0	0	96	80.00	24	20.00	0.80
2.	Land preparation	0	0	64	53.33	56	46.67	0.53
3.	Propagation method	0	0	111	92.50	9	7.50	0.93
4.	Planting time	0	0	88	73.33	32	26.67	0.73
5.	Spacing	0	0	0	0	120	100.00	0
6.	Seed rate	0	0	0	0	120	100.00	0
7.	Manuring	0	0	16	13.33	104	86.67	0.13
8.	Irrigation & water management	0	0	0	0	120	100.00	0
9.	Intercultural operations	0	0	75	62.50	45	37.50	0.63
10.	Harvesting time	54	45	60	50.00	6	5.00	1.40
11.	Disease & pest	0	0	0	0	120	100.00	0

**Table 2. Distribution of respondents based on overall adoption level of ginger cultivation practices**

Sr. No.	Adoption Level	Frequency (No. of Respondents)	Percentage (%)
1.	Low(<5.83)	20	16.67
2.	Medium(5.83-8.31)	90	77.50
3.	High(>8.31)	10	8.33
	Total	120	100.00

Mean=7.07, SD=1.24

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