



KNOWLEDGE LEVEL OF GINGER GROWERS ON THE RECOMMENDED TECHNOLOGIES AT LOWER DIBANG VALLEY DISTRICT OF ARUNACHAL PRADESH

Khembu Miso

Department of Agricultural Extension, SASRD: NU.

Mary N. Odyuo

Assistant Professor, Department of RDP, SASRD: NU. 797106.

Dr. J. Longkumer

Professor, Department of Agricultural Extension, SASRD: NU.

Dr. Moanungsang

*Assistant Professor, Department of Agricultural Extension,
SASRD: NU.*

ABSTRACT

KEYWORDS:

Knowledge, Recommended technologies, Dependent, Independent.

This paper emphasizes the knowledge level of ginger growers towards the recommended technologies of Ginger in the State of Arunachal Pradesh, India. Knowledge level of the respondents was measured by preparing a list of knowledge items basing on the package of practices for ginger recommended by the Department of Horticulture, Arunachal Pradesh. The knowledge items as specified by Department of Horticulture, Arunachal Pradesh, covered 24 aspects i.e., climate, soil, sowing time, seed rate, propagation, land preparation, spacing, seed treatment, cultivars, manuring and fertilization, irrigation, mulching, weeding, inter cultivation, inter cropping, crop rotation, disease, disease management, pest, pest management, cultural management of disease, harvesting, processing and storage. Each practice was framed in a question form to obtain the response from the respondents. The answers to the questions were quantified by giving score '1' if they have knowledge about the practice and score '0' if they were not having knowledge about the practice. In the present study, the socio-economic characteristics of the respondents were considered as Independent variables and the level of Knowledge as the dependent variable. Through this study, it was concluded that the knowledge level of the respondents was medium about the different aspects of recommended ginger cultivation practices in the study area.

INTRODUCTION

Ginger (*Zingiber officinale* Rosc.) is a perennial herb and one of the earliest known oriental spices and is being cultivated in India both as a fresh vegetable and as a dried spice since time immemorial. It is a tropical species native to Southeast Asia, belonging to the family *Zingiberaceae*. Ginger rhizome contains "gingerol" which is the main bioactive compound in ginger responsible for medicinal value and pungency in ginger.

Ginger is commercially cultivated in India, China, Nepal, Nigeria, Jamaica, Bangladesh, Fiji, Africa, Mexico, Japan and Indonesia. Nigeria rank first in terms of area of cultivation followed by India. But India ranks first in terms of productivity, followed by China, Nigeria and Bangladesh respectively.

In India, ginger has been cultivated in an area of 164 thousand hectares with total production and productivity of 1,109 million tons and 6.76 million tons per hectare, respectively (National Horticulture Board, 2016). India is the largest producer and consumer of ginger in the world. In India, ginger is grown in almost all the states. The main producing states in India are Assam, Kerala, Gujarat, Mizoram, Sikkim, Orissa, Arunachal Pradesh and Meghalaya. Maximum area under ginger cultivation is in Assam (18.1 thousand ha), where production is quite high (123.9 thousand tons), then Kerala with area 12.2 thousand hectare and is 56.2 thousand tons production, followed by Gujarat and Mizoram with 2.8 and 4.5 thousand hectare area respectively and 39.1 and 38.0 thousand tons, of production respectively (Sharma, 2013).

The present study was conducted in the state of Arunachal Pradesh which covers an area of 83,743 square kilometers. It borders the states of Assam and Nagaland in the south, and share international borders with Bhutan in the west, Myanmar in the east and China in the north. Arunachal's agro-climatic conditions favour agriculture, horticulture and forestry, offering immense potential in the areas. Agriculture is the main occupation of the people nearly 70 per cent of the population is engaged in agriculture and allied sector. Ginger being one of the most important spice crops in the state, grown in district like Lower Dibang Valley, Lohit, East Siang, West Siang, Changlang and rest of the other part of the state. Therefore, Arunachal Pradesh was purposively selected for the study.

Major portion of land of Arunachal Pradesh falls under mountains and hills with an elevation between 60 meters and 7300 meters. They largely come under the Himalayan and Patkai mountains range. The state total cultivable land under jhum/shifting cultivation was 1.10 lakh hectares and under permanent cultivation was only 0.90 lakh hectares. Most of the cultivable areas are under rain fed. The state receives heavy to moderate rainfall and its rivers and streams get plenty of water throughout the year. Average rainfall varies from 164mm to 5600mm (Verma, 2013). In Arunachal Pradesh, Basar Local is very much popular due to high yield and its adaptability to the area (Yadav *et al* 2004).

There are 21 districts in Arunachal Pradesh. Among which Lower Dibang Valley District was selected for the study, because ginger is one of the most important commercial crops of the district and it is the largest producer of ginger in the state. Agro-climatic conditions are conducive for ginger cultivation. Therefore, the Lower Dibang Valley District was purposively selected for the study.

OBJECTIVE OF THE STUDY

- Knowledge level of Ginger growers based on the recommended technologies

RESEARCH METHODOLOGY

Sources of data collection:

In the present study, primary and secondary data have been collected. Primary data was collected from the respondents (Ginger growers) with the help of structured schedule as well as through personal interview techniques to avoid the influence of other fellow farmers and to enable free expression of views. Secondary data was collected from various published and unpublished materials viz, journals and magazines, seminar paper presentations, websites etc., related to the problem of the study.

Sampling Design:

The present study is limited to Lower Dibang Valley District of Arunachal Pradesh. The sampling technique used in this study is purposive sampling.

Out of 3 Community/Rural Development (CD/RD) Blocks, 2 were selected for the present study, namely, Roing CD block and Dambuk CD block.

From the 2 CD Blocks, 8 villages, 4 from each CD Blocks were selected, namely, Koronu, Injonu, Denlo and Kesoli from Roing CD block and, Sirang, Publong, Rime and Bizzari from Dambuk CD block.

A total of 120 ginger growers/respondents were purposively selected. The sample sizes of every village were maintained at 15 respondents respectively for this study.

FINDINGS AND DISCUSSION

A set of data relating to knowledge level of farmers about the recommended practices of ginger cultivation have been analysed and presented in Table 1 for determining the reality.

1. Knowledge level of ginger growers about the recommended practices of ginger cultivation

In the present study, knowledge is referred to the body of information understood and retained by the respondents about the ginger cultivation practices. To study the knowledge level of the respondents a list of knowledge items were prepared by referring to the package of practices for ginger recommended by the Department of Horticulture, Arunachal Pradesh. The knowledge items as specified by Department of Horticulture, Arunachal Pradesh, covered 24 aspects i.e., climate, soil, sowing time, seed rate, propagation, land preparation, spacing, seed treatment, cultivars, manuring and fertilization, irrigation, mulching, weeding, inter cultivation, inter cropping, crop rotation, disease, disease management, pest, pest management, cultural management of disease, harvesting, processing and storage. Each practice was framed in a question form to obtain the response from the respondents. The answers to the questions were quantified by giving score '1' if they have knowledge about the practice and score '0' if they were not having knowledge about the practice.

In order to find out the knowledge level of ginger grower's, knowledge index was calculated. A total of 30 questions were framed covering the given aspects. Thus, the maximum possible score was 30 and the minimum was zero. The summation of scores of the correct answers for a particular respondent indicates his/her knowledge level about improved cultivation practices of ginger.

Table 1: Knowledge level of the respondents about the recommended practices of ginger cultivation.

Knowledge level is generally understood as an intimate acquaintance of an individual with facts. English and English (1958) had defined knowledge as a body of understood information possessed by an individual or by culture. A structured interview schedule was developed based on the recommendation practices given by the Department of Horticulture, Arunachal Pradesh.

1.1 Knowledge level of the respondents based on climate, land preparation, sowing and soil N=120

Sl. No.	Practices	Frequency	Percentage
1	Climate: Ginger grows well in warm and humid climate. It does not grow well in those areas where the temperature is more than 32°C with low relative humidity	20	16.67
2	Land preparation: a) It requires 3-4 ploughing to bring the soil into fine friable.	120	100
	b) Ginger should not be planted in a same field year after year.	120	120
3	Sowing time: It is sown from April to May in Lower Dibang Valley. But the best time is middle of April when there is sufficient moisture in the soil.	120	100
4	Soil: A rich soil with good drainage and aeration is ideal for its cultivation. It grows well in sandy or clay loam soil, red loam and lateritic loam soil.	80	66.67

Table 1.1 shows that 16.67 per cent of the respondents have knowledge regarding the climate followed by soil with 66.67 per cent. Table further shows that 100 per cent of the respondents have knowledge that ginger was sown during April to May and the best time for sowing was middle of April.

It also showed that 100 per cent of the respondents have knowledge about the land preparation required for cultivation of ginger and 100 per cent of the respondents have knowledge that ginger should not be grown again in the same field, because it does not give good yield.

1.2 Knowledge level of the respondents based on recommended cultivars, seed rate, spacing and propagation N=120

Sl. No.	Practices	Frequency	Percentage
1	Cultivars: a) Nadia: It is high yielding variety, produces green ginger about 21-23 t/ha with dry matter recovery of 22.40 per cent crude fibre content. This variety is well adapted to the study area.	40	33.33
	b) Maran: It is a popular variety of Assam and least affected by <i>Phythium aphanidermatum</i> . The percentage of dry ginger recovery is 22.10 and crude fibre is about 6.1 per cent. Suitable for oil and oleoresin extraction.	40	33.33
	c) China: It is an exotic high yielding variety and well adapted to the study area. It has 6.0 per cent crude fibre and 15 per cent dry ginger recovery. It yields around 20t/ha.	0	0
	d) Vareda: This variety has been developed by IISR, Calicut. The variety has very low fibre content (around 3.8%) and high yield potentials. The rhizomes are attractive and bold size. It gives 18-20t/ha.	0	0
2	Seed rate: 18-20 quintals rhizomes of 20-25 g are required for one hectare land. The rhizome should be true to type and free from disease and pest.	90	75
3	Spacing: Spacing of 30 cm between rows and 25 cm between plants is considered ideal for ginger. The rhizomes are placed at a depth of 4-5 cm in furrows and covered with soil.	97	80.83
4	Propagation: Ginger is propagated through ginger rhizomes, known as bits. Four to five cm long sprouted bits are required.	120	100

Table 1.2 shows that only 33.33 per cent of the respondents have knowledge about Nadia and Maran cultivars. Table further shows that 75 per cent of the respondents have knowledge about seed rate followed by spacing with 80.83

per cent. Table also shows that 100 per cent of the respondents were having knowledge about the propagation method of ginger cultivation.

1.3 Knowledge level of the respondents based on seed treatment, manuring and fertilization and irrigation

N=120

Sl. No.	Practices	Frequency	Percentage
1	Seed treatment: Before planting rhizomes should be dipped in cow urine for half an hour. Smoking seed rhizomes once or twice before storage is also beneficial. Seed rhizomes are also treated in hot water at 48°C for 20 minutes before planting. The seed can also be treated with Dithane M-45 @ 2g/litre of water.	0	0
2	Manuring and fertilization: Farmyard manure 20 tonnes/ha should be applied at the time of field preparation followed by N: P: K: @ 100:90:90 kg/ha. 1/3 nitrogen and full dose of phosphorous and potassium is applied at the time of planting. 1/3 quantity of nitrogen is applied 45 days after planting and remaining 1/3 of nitrogen is applied at 90-95 days after planting.	0	0
3	Irrigation: The critical stages for irrigation are during germination, rhizome development (135DAP) and rhizome initiation (90DAP).	0	0

Table 1.3 shows that 100 per cent of the respondents were not having any knowledge about irrigation, seed treatment and irrigation. From the Table we can conclude that

farmers were not having any knowledge regarding seed treatment, manuring and fertilization and irrigation

1.4 Knowledge level of the respondents based on intercropping and crop rotation

N=120

Sl.No.	Practices	Frequency	Percentage
1	Inter cropping: Ginger is inter cropped with green manure such as Daincha and sunhemp.	120	100
2	Crop rotation: Ginger is rotated with paddy, maize and vegetables.	31	25.83

Table 1.4 shows that 100 per cent of the respondents have knowledge about inter cropping that ginger is inter cropped with daincha and sunhemp. Table also shows that 25.83 per cent of the respondents have knowledge about crop rotation.

From the Table we can conclude that farmers had good knowledge about inter cropping but lacking good knowledge about crop rotation. It may be because of lack of knowledge about crop rotation.

1.5 Knowledge level of the respondents based on inter cultural operation, weeding and mulching

N=120

Sl. No.	Practices	Frequency	Percentage
1	Inter cultural operation: a) Proper drainage channels are to be provided when there is stagnation of water.	120	100
	b) Earthing up is essential to prevent exposure of rhizomes and provide sufficient soil volume for free development of rhizomes. It is done at 45 days after planting immediately after weeding and application of fertilizers. At least two earthing up is required for better growth and development of rhizomes.	120	100
2	Weeding: The first weeding is done just before the second mulching and second weeding is done depending upon the intensity of the weeds.	120	100
3	Mulching: Mulching the ginger beds with green leaves is an essential operation to enhance germination of seed rhizomes and to prevent washing off soil due to heavy rain.	120	100

Table 1.5 shows that 100 per cent of the respondents were having knowledge about the inter cultural operation such as proper drainage channel are to be provided when there is water stagnation and earthing up operation to prevent exposure of ginger rhizomes and provide sufficient volume for free development of rhizomes. Table also shows that 100

per cent of the respondents were having knowledge about weeding followed by mulching with 100 per cent respectively. From the Table we can conclude that farmers were having good knowledge about inter cultural operation, weeding and mulching.

1.6 Knowledge level of the respondents based on disease, disease management, pest, pest management and cultural management of disease

N=120

Sl. No.	Practices	Frequency	Percentage
1	Disease: Soft Rot is the most destructive disease of ginger which results in total loss of affected lumps.	120	100
2	Disease management: a) Seed rhizomes are to be selected from the disease free gardens, since the disease is seed borne.	120	100
	b) Treatment of seed rhizomes with Mancozeb 0.3% for 30 minutes before sowing and drenching at 30 and 60 DAP or drenching of Dithane Z-78@ 2g/litre of water at 30 days interval is effective for disease control	0	0
3	Insect: Stem borer (<i>Prodiectus haematicus</i>) the grubs bore into the pseudostem and cause Dead heart.	107	89.17
4	Insect management: Spraying of Monocrotophous or Fenitrothion @ 1-1.5 ml/litre of water is found effective for control of insect and application of <i>Trichoderma harzanium</i> .	0	0
5	Cultural management of disease: Cultural practices such as selection of well drained soils for planting, soil solarization, removal of disease clumps from the field.	120	100

Table 1.6 shows that 100 per cent of the respondents were having knowledge about the soft rot disease which was responsible for major economic loss of ginger followed by disease management with 100 per cent of the respondents have knowledge that Seed rhizomes are to be selected from the disease free gardens, since the disease is seed borne and 100 per cent of the farmers were not having knowledge about treatment of seed rhizomes with Mancozeb 0.3% for 30 minutes before sowing and drenching at 30 and 60 DAP or drenching of Dithane Z-78@ 2g/litre of water at 30 days interval is effective for disease control respectively.

Table further shows that 100 per cent of the respondents were having knowledge about cultural management of disease such as selection of well drained soils for planting, removal of clumps from field and soil solarization. Table also shows that 89.17 per cent of the respondents were having knowledge about insect infestation and 100 per cent were not having knowledge about insect management.

From the table we can conclude that majority of the respondents know the disease and insect as well as cultural management, but they lack the knowledge of insect and disease management it might be because of lack of technical knowledge or they have not attended/given any training regarding the insect and disease control.

1.7 Knowledge level of the respondents based on harvesting, processing and storage.

N=120

Sl.No.	Practices	Frequency	Percentage
1	Harvesting: Harvesting for vegetable purpose starts at 180 DAP. It is ready for harvesting after 8 months of planting that is when the leaves turn yellow and start drying.	120	100
2	Processing: Processing of ginger involves peeling, sun drying, polishing and grading.	109	90.83
3	Storage: a) Dry ginger packed in gunny bags is highly susceptible to infestation by insects during storage.	90	80
	b) Fully dried rhizomes can be stored in air tight container such as light density polyethene.	0	0
	c) Long term storage for more than two years result in deterioration of aroma and flavor.	29	24.17

Table 1.7 shows that 100 per cent of the respondents were having knowledge about harvesting for vegetable purpose starts at 180 DAP and it is ready for harvesting after 8 months DAP and when the leaves turn yellow and start drying. The Table further shows that 90.83 per cent of the respondents were having knowledge about the processing of ginger such as peeling, sun drying and grading followed by 80 per cent of the respondents were having knowledge regarding the storage like

dry ginger packed in gunny bags are highly susceptible to insect infestation by insect and 100 per cent of the respondents were not having knowledge that fully dried rhizomes can be stored in air tight container such as light density polythene followed by 24.17 per cent of the respondents have knowledge about long term storage for more than two years result in deterioration of aroma and flavor.

From the Table we can conclude that farmers were having good knowledge about harvesting and processing but they were lacking knowledge related to storage, it is because they

do not keep the ginger for longer period; irrespective of price, they sell the produce immediately after harvesting as they do not have storage facility.

1.8 Distribution of the respondents based on overall knowledge level

N=120

Sl. No.	Category of knowledge	Frequency	Percentage	Mean	SD
1	Low (<57)	23	19.17	64	7
2	Medium (57-71)	76	63.33		
3	High (>71)	21	17.5		

To measure the knowledge level of the respondents, knowledge index was developed. The category was made as low, medium and high based on the mean and standard deviation. Table 1.8 based on categorization shows that 63.33 per cent of the respondents were under the medium knowledge level category forming the major segment followed by low knowledge level category with 19.17 per cent of respondents

and high knowledge level category with 17.5 per cent of respondents. And the overall knowledge index of the respondents about the different aspects of recommended practices of ginger cultivation was 64 per cent. Thus, it can be concluded that the knowledge level of the respondents was medium about the different aspects of recommended ginger cultivation practices in the study area.

2. Correlation between independent variables and dependent variables

Table 2.1 Correlation between independent variables and knowledge index

N=120

Sl. No.	Independent Variables	Coefficient correlation
1	Age	0.404061 **
2	Sex	0.113496 NS
3	Family size	0.27993825 **
4	Income from ginger	0.15963455 *
5	Area under ginger cultivation	0.129902495 NS
6	Education	-0.33904271 NS
7	Experience	0.47904607 **
8	Mass media	-0.09550972 NS
9	Personal localite	-0.08331593 NS
10	Extension contact	0.042967365 NS

*Significant at 5 per cent; **Significant at 1 per cent; NS-Not significant

The findings presented in the Table 2.1 reveals the correlation analysis between the various socio-economic factors and the knowledge level of the ginger growers

The correlation value between the age and the knowledge level of the respondents is 0.404061. The result is statistically significant at 1 per cent and thus it can be concluded that age of the respondents have positive relation with the knowledge level of the respondents regarding the recommended practices of ginger cultivation.

The correlation value between the sex and the knowledge level of the respondents is 0.113496. The result is not statistically significant and thus it can be concluded that sex of the respondents does not have any relation with the knowledge level of the respondents regarding the recommended practices of ginger cultivation.

The correlation between the family size and the knowledge level of the respondents is 0.27993825. The result is statistically significant at 1 per cent and thus it can be concluded that family size of the respondents have positive relation with the knowledge level of the respondents regarding the recommended practices of ginger cultivation.

The correlation between the income from ginger and the knowledge level of the respondents is 0.15963455. The result is statistically significant at 5 per cent and thus it can be concluded that income from ginger of the respondents have positive relation with the knowledge level of the respondents regarding the recommended practices of ginger cultivation.

The correlation between the area under ginger cultivation and the knowledge level of the respondents is 0.129902495. The result is not statistically significant. Thus it can be concluded that the respondents with area under ginger cultivation does not have any relation with knowledge level regarding the recommended practices of ginger cultivation.

The correlation between the education and the knowledge level of the respondents is -0.33904271. The result is not statistically significant and thus it can be concluded that education of the respondents does not have any relation with the knowledge level of the respondents regarding the recommended practices of ginger cultivation.

The correlation between the experience and the knowledge level of the respondents is 0.47904607. The result is statistically significant at 1 per cent and thus it can be concluded that experience of the respondents have positive relation with the knowledge level of the respondents regarding the recommended practices of ginger cultivation.

The correlation between the mass media and the knowledge level of the respondents is -0.09550972. The result is not statistically significant and thus it can be concluded that mass media does not have any relation with the knowledge level of the respondents regarding the recommended practices of ginger cultivation.

The correlation between the personal localite and the knowledge level of the respondents is -0.08331593. The result is not statistically significant and thus it can be concluded that personal localite does not have any relation with the

knowledge level of the respondents regarding the recommended practices of ginger cultivation.

The correlation between the extension contact and the knowledge level of the respondents is 0.042967365. It is statistically not significant and it shows that extension contact does not have any relation on the knowledge level of the respondents.

It is clearly seen in the Table that independent variables viz., age, family size, income from ginger and experience had significant association with the knowledge level of the respondents.

CONCLUSION AND RECOMMENDATIONS

From this study it was found that 16.17 per cent of the respondents have knowledge regarding the climate followed by soil with 66.67 per cent. Study further shows that 100 per cent of the respondents have knowledge that ginger was sown during April to May and the best time for sowing was middle of April. It also shows that 100 per cent of the respondents have knowledge about the land preparation required for cultivation of ginger and 100 per cent of the respondents have knowledge that ginger should not be grown again in the same field.

It showed that only 33.33 per cent of the respondents have knowledge about Nadia and maran. It further shows that 75 per cent of the respondents have knowledge about seed rate followed by spacing with 80.83 per cent. Study also shows that 100 per cent of the respondents were having knowledge about the propagation method of ginger cultivation.

Study showed that 100 per cent of the respondents were not having any knowledge about irrigation, seed treatment and irrigation.

Study showed that 100 per cent of the respondents were having knowledge about the inter cultural operation such as proper drainage channel are to be provided when there is water stagnation and earthing up operation to prevent exposure of ginger rhizomes and provide sufficient volume for free development of rhizomes.

Study showed that 100 per cent of the respondents have knowledge about the weeding that is an essential operation in ginger cultivation. It also shows that 100 per cent of the respondents have knowledge about the mulching operation.

Study showed that 100 per cent of the respondents were having knowledge about inter cropping followed by crop rotation with 25.83 per cent respectively.

Study revealed that 100 per cent of the respondents were having knowledge about the soft rot disease which was responsible for major economic loss of ginger followed by disease management with 100 per cent of the respondents have knowledge that Seed rhizomes are to be selected from the disease free gardens, since the disease is seed borne and 100 per cent of the farmers were not having knowledge about seed treatment of rhizomes with Mancozeb 0.3% for 30 minutes before sowing and drenching at 30 and 60 DAP or drenching of Dithane Z-78@ 2g/litre of water at 30 days interval is effective for disease control respectively. It also

shows that 100 per cent of the respondents were having knowledge about cultural management of disease such as selection of well drained soils for planting, removal of clumps from field and soil solarization and 100 per cent of the respondents were not having knowledge about insect management followed by insect infestation with 89.17 per cent respectively.

Study showed that 100 per cent of the respondents were having knowledge about harvesting for vegetable purpose starts at 180 DAP and it is ready for harvesting after 8 months DAP and when the leaves turn yellow and start drying. It also shows that 90.83 per cent of the respondents were having knowledge about the processing of ginger such as peeling, sun drying and grading followed by 80 per cent of the respondents were having knowledge regarding the storage like dry ginger packed in gunny bags are highly susceptible to insect infestation by insect and 100 per cent of the respondents were not having knowledge that fully dried rhizomes can be stored in air tight container such as light density polythene followed by 24.17 per cent of the respondents have knowledge about long term storage for more than two years result in deterioration of aroma and flavor.

Study revealed that 63.33 per cent of the respondents were under the medium knowledge level category forming the major segment followed by low knowledge level category with 19.17 per cent of respondents and high knowledge level category with 17.5 per cent of respondents and the overall knowledge index of the respondents about the different aspects of recommended practices of ginger cultivation was 64 per cent. Therefore it can be concluded that knowledge level of respondents in the study area was medium.

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