

Traditional Knowledge for Resilient Livelihood: Agriculture sector' book



Trinamul Unnayan Sangstha

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Published

April 30, 2021

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Preamble Message from the Editor

Chittagong Hill Tracts is located in the South Eastern part of Bangladesh that comprises of the three Hill Districts of Bandarban, Rangamati and Khagrachari. It shares common international border with Myanmar and India (the states of Mizoram and Tripura). The region is largely hilly and rocky which made the region different from other parts of the country. There are 11 ethnic communities have been living with their rich cultural practices and heritage from time immemorial. The ethnic communities have been living with subsistence based economy, which is largely dependent on forest. Besides plough cultivation, fisheries, livestock and poultry, the jum or hill farming and gathering of forest produces are major sources of traditional livelihood of the people of the region. Therefore, these peoples have strong indigenous knowledge and practices on natural forest management which nurtured and conveyed for generations for maintaining livelihood. CHT is special zone of Traditional knowledge and biodiversity. Climate resiliency and food security are major concerns of IPs which has connection with traditional knowledge.

In this regard, Trinamul Unnayan Sangstha (TUS) implemented a project titled "Enhancing Food security and Climate resiliency through Traditional Knowledge" supported by Asia Indigenous Peoples Pact (AIPP) and funded by PAWANKA Fund (Indigenous Ways of Knowing & Learning Fund) from 01 July 2019 to 30 April 2021. Under this project TUS experimented the degree of resilience and viability of some traditional crops such as Jummo

Humoro/Jum Pumpkin, Jummo Tumbaj Humoro/Jum Aromatic Gourd, Jummo Susmoris/Jum Chilly, Jummo Mokke/Jum Maize, Sorbo Tidegulo/Jum Biter Gourd, Jommo Mammara/Jum Marfa, Juro Alu/Jicama, Tettogulo/Bitter Gourd and Jummo Deroj/Jum Okra through ten demonstration plots. TUS also assessed marketability of these crops to scale up production and sustain the traditional practices in adaptive manner using Traditional Knowledge. Thus, TUS documented the cultivation processes, harvesting techniques, seeds collection and preservation techniques of the traditional and local crops. To promote and recognize the contribution of Indigenous communities' in the sector of sustainable agriculture and livelihood TUS published the 'Traditional Knowledge for Resilient Livelihood: Agriculture sector' book.'

Hence, I would like to take the opportunity to express our gratitude to all Jumias and farmers who enriched the book by providing information or data. All credit goes to my colleagues who assisted me to collect, compile and review the data. I hope this book will help those guys who feel interest to do research on sustainable resilient livelihood in Chittagong Hill Tracts.

Ripan Chakma

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Chapter-1

JUM CROPS



Jummo Sugurigulo (Jum Pumpkin) Cultivation:

Introduction: Jummo Sugurigulo is Chakma words, it means jum pumpkin. It is jum variety pumpkin and drought tolerant crops which grown in jum field or sloping place of high land. It is different from other ordinary pumpkin which is grown at plane land and other places. It is also different from others in terms of flavor, test, stickiness, shape and size.

Cultivation Process: The jum farmer grows it in the month of Boishakh (April-May) in jum field. They prepare jum field in month of Choitro (March-April) and sow seeds in the beginning of April. They think that the soil becomes insect free and fertile due to burn and ashes as well hold maximum nutrition which help the plants to grow fast. They also concern that if they sow seed earlier in mid of Choitro (March-April) they will get production earlier and get high price. After sowing seeds it takes time 8-9 days to germinate and bosoms within 2 months.

Harvesting period and Techniques: The jum farmer harvests green Sugurigulo in the month of Vadra (August-September)



Figure 1 Jum pumpkin, maize and aromatic wax gourd

when the fruit is matured and edible as vegetable. The jum farmer harvest the ripen Sugurigulo in the month of Posh (December-January). However, harvesting time depends on market demand and customer's food habit. Hence, Chakma, Marma and Tripura communities like green Sugurigulo as vegetable rather than ripen. Thus, they harvest on the basis of customer demand and market price. Finally, the farmer harvest it when the stem of the plant begin to shrivel and the fruit attain deep solid woody color and hard. Usually, the jum farmer collects those fruits manually. Sometimes they use chari (sickle) for cutting the stalk/stem. They cut it keeping about 5 cm of stalk and reject moth-eaten or rotten.

Seed collection and preservation: The jum farmer usually chooses Sugurigulo which looks good shape, healthy and has no marks of moth-eaten for seed collection. The selected fruit taken care to ripe about 1.5 months before harvest. It is kept in dry and darker place for 8-10 days after harvest. They think that it helps the seeds inside ready to be preserved. The ripen fruit also edible as vegetable after collection of seeds. The seeds need to be sun dried for 1-2 days before preservation and make sure that the seeds have dried up well otherwise it can be damaged or get rotten if a single seed remain undried. Once the seeds are no more sticking with each other they are perfect to put in a piece of cloth. It helps to keep the seeds dry by absorbing the seasonal hydration. Then finally, the seeds can be preserved in a common seed preserving jar or pot. Although earlier the jum farmers used Ludung¹ to preserve the seeds in it and hanged it on top of the cooking place which helps to avoid insect's harm.

¹ A traditional pot made with bottle gourd

Mammara or Marfa (Jum Cucumber) Cultivation:

Introduction: Mammara or marfa is Chakma and Tripura words accordingly, it means jum cucumber. It is a local vegetable and different from other ordinary cucumber which is grown at plane land. It tastes like cucumber but when ripen it tastes slightly sour and sweet. It is different from others in terms of flavor, test, shape and size. It is drought tolerant vegetable and grown in jum field or sloping areas of high land.

Cultivation Process:

Jum farmer grows marfa in the month of Boishakh (April-May) in jum field. They prepare jum field in the month of Choitro (March-April) and sow seeds along with rice and other crops in early April. They think that the soil become insect free and fertile due to burn and ashes as well hold maximum nutrition which helps the plants to grow fast. The fruit takes at least 2.5 months to blossom and



Figure 2 Jum mammara or marfa

takes 5 months to produce as edible vegetables. It needs 6 months to ripe. After harvest it long last around 6 months.

Harvesting period and Techniques: Jum farmer harvests marfa in the month of Shraban-Vadra (July-August) when the fruit is matured as vegetable. However, harvesting time depends on

market demand. Hence, Chakma, Marma and Tripura communities like green marfa as vegetable and horboo/lakchu (salad) rather than ripen. Thus, they harvest on the basis of customer demand and market price. Finally, the farmer harvests it when the stem of the plant begin to shrivel and the fruit attain deep solid woody color. Usually, the jum farmer collects it manually. Sometimes they use chari (sickle) for cutting the stalk/stem.

Seeds collection and preservation: Jum farmer selects healthy fruit in shape and size and avoids moth-eaten during seeds collection. They collect seeds from fully ripe fruit and dry at Sun for 4-5 days at least. The seeds need to be dried properly for preservation otherwise not ideal to implant. Traditionally Mammara seeds are preserved in a dry place near the cooking spot because the smoke keep seeds dry and prevent from insects damage.

Jummo Tumbaj Humuro (Aromatic Wax Gourd) Cultivation:

Introduction: Jummo tumbaj humuro is a Chakma word means jum aromatic wax gourd. It is a favorite vegetable for Chakma, Marma and Tripura communities and different from other ordinary wax gourd which is grown at plane land. It is different from others in terms of flavor, test, shape and size. It is also a drought tolerant vegetable and grown in jum field or sloping areas of high land.

Cultivation Process: Jum farmer grows it in the month Boishakh (April-May) in jum field. They prepare jum field in the month of Choitro (March-April) and sow seeds along with rice and other crops in early April. That time the soil become insect free and fertile due to burn and ashes as well hold maximum nutrition which helps the plants to grow fast. They also concern that if



Figure 3 An experimental plot of aromatic wax gourd to plane land

they sow seed earlier in mid Choitro they will get production earlier and get high price. It takes around 3 months to blossom and takes around 5 months to take/eat as vegetables. When the fruit spreads aromatic scent then the farmer guesses it is matured to harvest.

Harvesting period and Techniques: Jum farmer basically harvests jummo tumbaj humuro in the month of Vadra (August-September) when the fruit is matured and edible as vegetable. The jum farmer harvests the ripen fruit in the month of Posh (December-January). They ensure maturity or perfect ripen by scratching on the skin. If the inner skin is hard and reddish then the farmer harvests it for seed preservation. It is harvested manually in traditional way. They use chari (sickle) for cutting the stalk/stem.

Seeds collection and Preservation: Jum farmer selects healthy fruit in shape, size and avoids moth-eaten fruit for collection seeds. They collect seeds in the month of Kartik (October-November) when it is fully ripen. They dry the seeds properly and

preserve in pot or jar and hang near the cooking place. The smoke keeps the seeds dry and protect from insects injurious.

Jummo Cindire (Jum Muskmelon) Cultivation:

Introduction: Jummo cindire is a Chakma word means jum muskmelon. It is a favorite fruit for Chakma, Marma and Tripura communities in Chittagong Hill Tracts. It is different from other ordinary muskmelon which is grown at plane land. It is different also from others in terms of flavor, test, shape and size. It tastes like muskmelon but when ripen it tastes slightly sour and sweet. It is a drought tolerant and summer fruit and grown in jum field or sloping areas of high land.



Figure 4 Jum Muskmelon

Cultivation Process: Jum farmer grows it in the month of Boishakh (April-May) in jum field. They make ready jum field in the month of Choitro (March-April) and sows seeds along with rice and other crops in early April. It takes around 2.5 months to blossom and takes more 5 months to produce as edible fruit. The fruit spreads aromatic scent when it is matured and then the jum farmer harvests it otherwise it goes to be rotten.

Harvesting period and Techniques: Jum farmer harvests fruits in the month of Ashwin (September-October). Chakma, Marma and Tripura communities like it as fruit. Jum farmer ensures maturity or perfect ripen by scratching on the skin. Usually, jum farmers harvest it manually following traditional knowledge. Sometimes they use chari (sickle) for cutting the stalk/stem.

Seeds collection and Preservation: Jum farmer selects healthy fruit in shape, size and avoids moth-eaten fruit for collection seeds. They collect seeds from fully ripe fruit and dry properly. They preserve it in pot or jar and keep in a dry place near the cooking spot which is called Utto² (scaffold). The Utto keeps the seeds dry due to smoke and prevent from insects damage.

Jummo Begoon (Jum Brinjal) Cultivation:

Introduction: Jummo begoon is a hill variety of brinjal that is only grown in jum field. This variety of brinjal is green in colour and grown in shape of round, pear, long and skinny. It also has a unique scent and size.

Cultivation period: The jummo begoon seeds are spread in early of Boishakh (April-May) . During the month of Shrabon (July-August) the fruits are ready to be plucked. It is also considered as peak hour for harvesting.

Cultivation Process: The jummo begoon is basically cultivated in jum. The seeds of jummo begoon are spread in jum field. Seeds should be spread within a week after the prepared the jum field so that the remaining ashes can protect the seeds from insects.

Harvesting Period and Technique: The Shrabon (July-August) is the peak hour to harvest the jummo begoon. However, the

2 The Chakma community makes scaffold with bamboo above the cooking place to keep goods or article dry

cultivation period can be extended till to Ashwin (September-October).

Seeds collection and Preservation: Traditionally it is believed that during the month of Ashwin (September-October) the jummo begoon seeds should be preserved as this is the month when the fruits are less infected. Once plucked the perfect fruit it is to be left for 15 days. The seeds are preserve able though the fruit gets rotten. Also the seeds are to be sundried for 2-3 days before preserving in a store and also for 1 day before spreading it in the jum. Moreover, it is traditionally believed that the begoon plants should be cultivated in a cooler place. It helps the plant to grow fruits for a longer period of time. Lastly, to disinfect the plants jum farmers use the Dabapani³ (Hookah's water), Sabarangpani⁴ (Sabarang's water) and ashes as bio pesticide.

Jummo Sumi, Haru Sumi, Soobai Daga (Jum beans) Cultivation:

Introduction: Jummo sumi and haru sumi are variety of beans which are grown in jum field. The Chakma - community called it haru sumi and the Tripura community called it soobai daga. The shape of the haru sumi is half a circle and light green in colour.

Cultivation Period: The seeds of jummo sumi are implanted in the month of Boishakh (April-May). It takes 3 months to grow beans and edible for the next 3 months.

Cultivation Process: Jum farmer waits for rain when the jum field is ready because the rain could wet the hard soil then the seeds are perfect to be implanted. Seeds need to be implanted after the

3 'Daba' it is called 'Hookah' in Bangla. It is a traditional tobacco pipe makes with bamboo which draw the smoke through water contained bamboo pipe.

4 'Sabarang' is local spices leaves. It is popular to the Chakma Community.

first rain and 2-3 finger deep in the soil. The jum farmers do not throw away the grasses (weed) after cleaning the jum field, they use it as mulching and bio-fertilizer. They use the banana leaves as mulching which keep soil wet and the dumujje tree (a wild fruits tree) leaves and the horoi tree leaves are used as bio-fertilizer. They also use bio-pesticide to protect the plants from harmful insects.

Harvesting Period and Technique: The beans are grown in the month of Ashwin (September-October). The plants grow beans for 3 months among them the first two months are the season when the plants growth is at its pick.

Seeds collection and Preservation: For the collection of seeds Agrabayon (November-December) is ideal. This is to be noted that, any kind of beans seed should be preserved along with the skin of the bean. The skin should be peeled out only before implanting it. One week of sun drying is fine to preserve the beans.

Narahaba Sumi Cultivation:

Introduction: Narahaba sumi is a variety of beans which are grown in the jum field. The Chakma community called it narahaba sumi. The shape of the bean slightly shorter than common bean which is grown in plane land.

Cultivation Period: The seeds of narahaba sumi should be implanted in the month of Boishakh (April-May) along with the rice seeds after the first rain.

Cultivation Process: The seeds are to be implanted 2-3 fingers deep in the soil in the same whole where the rice seeds are also to be implanted. If the farmers focus is on growing the rice primarily then narahaba beans seeds should be implanted keeping a distance and gaps.

Harvesting Period and Technique: The beans are grown in the month of Ashwin (September-October), Kartik (October-November) and Agrahayan (November-December) among them the first two months are the main season and last month is the declining period.

Seeds collection and Preservation: Jum farmer collects seeds of bean in the month of Agrahayan (November-December), sometime they collect seeds in Posh (December-January) also when the beans are ripen. The farmer preserves it with casing of the bean. Basically the farmer dries it at sunshine for 3-4 days then preserve the beans at over the cooking place.

Soroppya Sumi Cultivation:

Introduction: Soroppya sumi is a variety of beans which are grown in the jum field. The Chakma community called it soroppya sumi. The shape of the bean slightly shorter than common bean which is grown in plane land.

Cultivation period: The seeds of beans should be implanted in the month of Boishakh (April-May) along with the rice seeds after the first rain.

Cultivation process: The seeds are to be implanted in the soil. When the plant is grown then the plant needs support of bamboo stick or small tree to climb. Traditionally the jum farmers make 'maja (scaffold)' with bamboo splits to climb the plants.

Harvesting Period and Technique: It grows bean in the end of Kartik (October-November). It takes usually one month more to ripen the beans than the other beans. However, this beans plant do not die after the harvesting season, it grows back again from the older roots. Hence, do not need to implant every year.

Seeds collection and Preservation: Jum farmer collects seeds of bean in the month of Agrahayon (November-December), sometime they collect seeds in Posh (December-January) also when the beans are ripen. The farmer preserves it with casing of the bean. Basically the farmer dries it at sunshine for 3-4 days then preserve the beans at over the cooking place.

Jige, Koide (Snake gourd, Ridge gourd) Cultivation:

Introduction: Jige/koide is a vegetable which are grown in the jum field, homestead and plane land. The Chakma called it Jige/koide, in Bangla it is called jinge and koida and in English it is called Snake gourd and ridge gourd. Jige in shape is slightly long and Koide is short.

Cultivation period and process: Jum farmer sows seeds of jige/koide in the month of Boishakh (April-May) in jum field after the first rain. When the plant is grown up then the plant needs



Figure 5 A women in front of her vegetable garden of Snake gourd

support 'gil' (bamboo or tree stick) or 'maja' (scaffold made with bamboo) to climb.

Harvesting Period and Technique: It grows in the end of Kartik (October-November). It takes usually one month more to produce edible jige/ koide. The farmer guesses when the vegetable is matured to harvest.

Seeds collection and Preservation: Jum farmer collects seeds of jige/koide in the month of Agrahayon-Posh (November-January) when the jige/koide are ripen well. The farmer preserves it with casing. Basically the farmer dries it at sunshine for 3-4 days then preserve the beans at over the cooking place.

Moma or Baikang Cultivation:

Introduction: A native vegetable grown in the hills. There are two types of moma- black and white colour. Only the white variety is edible. The white variety has two shapes- one is shorter while other lengthy in size.

Cultivation Period: The seeds need to be implanted in the month of Boishakh (April-May). It gives fruits in the middle of the Kartik (October-November).

Cultivation Process: The seeds are to be planted 3 inches deep in the soil after the first rain of Boishakh (April-May). The fruits are to be plucked when young while the fruits are edible as vegetable.

Harvesting Period and Technique: The fruit becomes edible as vegetable in the middle of Kartik (October-November) and stays till to Shrabon (July-August).

Seeds collection and Preservation: After the collection of the fruits it should be kept doing nothing. The fruits are to be hung up

on the fireplace where foods are cooked. Traditionally this is the best practice to preserve the seeds by hanging them over the fireplace of cooking. It prevents the seeds from insects and also keeps them dry which helps the seeds not to rot.

Suj Morich (Jum Chili) Cultivation:

Introduction: Suj morich is a variety of chili which cultivated locally in the jum field. These types of chilies are spicier than the other ordinary varieties. In Chakma language 'suj' mean needle and 'morich' mean chili that's mean smaller and skinny size chili. It is smaller in size but peppery and hot than size. There is a proverb in Chakma language 'suj morich' that mean 'small in size but hot' or it is similar to 'size does not matter for chopping wood'.

Cultivation Period: Jum farmer spreads the seeds of chili in the month of Boishakh (April-May) on the ashes while the jum field prepared. The seeds are to be spread before the first rain of the month of Boishakh (April-May) pours down the earth.



Figure 6 An experimental plot of jum chili to plane land

month of Boishakh (April-May) and waits for rain. They spread the seeds before one week of rain fall. After cleaning the jum field they spread the seeds into the ashes to protect the seeds from insects. The ashes used as fertilizer also to grow the plan faster. It is believed that the suj murich grows well in the place where 'egujje bas' (a variety of bamboo) grows. The jum farmers use banana leave as mulching which keeps the soil wet and the dumujje tree (a wild fruits tree) leaves and the horoi tree leaves are used as bio-fertilizer. They also use dabapani⁵ (hookah's water) as bio-pesticide also to protect the plants from harmful insects. Moreover, chili trees grown in a shadowy place have longer lives than others. The chili trees can grow chilies for more than two years.

Harvesting Period and Technique: Jum farmers harvest chili in the month of Shrabon (July-August). The chilies are available in the month of Vadro (August-September).

Seeds collection and Preservation: Jum farmer collects seeds of chilies in the month of Agrahayon (November-December), sometime they collect seeds in the moth of Posh (December-January) also when the chilies are ripen. The farmer preserves it with casing of the chilies. Basically the farmer dries it at sunshine for 3-4 days then preserve the chilies at over the cooking place.

Ujon Shak or Rosundoi (Ujon greens) Cultivation:

Introduction: It is a type of spinach or vegetables that tastes slightly like menthol. The Chakma community called it 'ujon shak' and the Tripura Community called it 'rosundoi'. It is grown locally in hills and plane land.

⁵ 'Daba' it is called 'Hookah' in Bangla. It is a traditional tobacco pipe makes with bamboo which draw the smoke through water contained bamboo pipe

Cultivation Period: It is grown naturally in hills and plane land. If anybody wants to cultivate it that the Boishakh (April-May) is the perfect time to plant the ujon shak. The greens are edible at the end of Ashar (June-July) and last till the month of Vadro (August-September).

Cultivation Process: The seeds of ujon shak have to be spread along with the seeds of suj morij. The seedlings can be seen growing within a week after seed spreading.

Harvesting period and Technique: Jum farmer harvests the ujon shak in the month of Shrabon-Vadro (July-September). This period is considerably the ideal for harvesting.

Seeds collection and Preservation: The plant grows flowers of red colour. One needs to wait till the flower changes its colour into darker shade. Once the flowers are in darker shades the flowers are to be sun dried for 2-3 days along with the plants. The seeds should be only removed from the dried plant before it is spread for another cultivation.



Figure 7 Ujon shak or Rosundoi



Figure 8 A sabarang garden

Sabarang/Bana (Spices leaves) Cultivation:

Introduction: Sabarang is a jum spices leaves. It is little bit similar to Indian curry leaves. It is popular as 'sabarang' in Chakma community and in Tripura community it is popular as 'bana'. It is a favorite spices for the Chakma and the Tripura communities in Chittagong Hill Tracts. It grows basically in jum field and hilly areas. Its leaves and seeds also are used in the curries as spices and for extra scent which is very compelling to the indigenous communities.

Cultivation Period: Jum farmer spreads the seeds in the month of Boishakh (April-May) in jum field. The farmer prepares bed mixing soil with ashes and takes time around 5 days to germinate seeds. The seeds are to be spread before the first rain pours down the earth.

Cultivation Process: The farmers prepare jum field in the month of Choitra (March-April) and spread seed in ending of the Boishakh (April-May). It should be spread seeds into ashes and before rain fall.

Harvesting Period and Techniques: Usually, sabarang becomes mature to harvest in the month of Ashar (June-July) and continued till to the Ashwin (September-October). The jum farmer harvests or plucks out it manually.

Seeds collection and Preservation: The jum farmer collects seeds when the plant turns to grey. The seeds are to be restored along with its branch and while spreading one just needs to hit the branch gently so that the seeds drop on the ashes. The month of Agrahayan (November-December) is ideal to restore seeds. It takes time 3-4 days to dry well and hang near the fire place.

Jummo Puji or Khuinchani (Spice leaves) Cultivation:

Introduction: Jummo puji is a jum spice leaves like as coriander leaves. It is a Chakma word, in Tripura it is called 'kuichani' and in English it is called 'coriander leaf'. It is a favorite spice leaves for Chakma, Marma and Tripura communities in Chittagong Hill Tracts. It is basically grown in jum field and high land.

Cultivation Process: Jum farmer sows seeds in the month of Boishakh (April-May) by spreading seeds separately from other crops and prepares beds in jum field before sowing seeds. Usually, it takes 20-25 days to emerge from beds.

Harvesting Techniques: Usually, jummo puji becomes mature to harvest in the month of Agrahayan (November-December). Jum farmer harvests or plucks out it manually.



Figure 9 Jummo puji or Khuinchani (spice leaves)

Seeds collection and Preservation: Jum farmer collects seeds when the plant turns to grey. During the seed collection the farmer chooses healthy and intact seeds. It takes 5-6 days to dry well and wrap with cloths and hang near the fire place.

Machho Baor (Spice Leaves) Cultivation:

Introduction: 'Maccho baor' is Chakma word, it is a kind of spice leaves like as coriander leaves. Chakma, Marma and Tripura communities like it as spice leaves. Usually it is cultivated at river bank and sloping area of hill. It can be cultivated in all seasons over the year. It is grown well at winter season.

Cultivation Process: The farmer prepares beds spading the soil and level the beds as required. The farmer pays attention so that the soil does not become lumpy. The farmer sows seeds in suitable time because the maccho baor can grow in all season. Usually, it takes 20-25 days to emerge from beds.

Harvesting Period and Technique: Maccho baor usually becomes edible after two months of sowing seeds. Regular weeding is also very important for its cultivation. If the farmer can provide regular watering to the plants, it grows faster. To collect the crop, the young part of the top of the plant is plucked by hand.

Seed Preservation Technique: In order to collect seeds, it is very important to select healthy and vigorous seedlings. To collect the seeds, the seedlings are dried well in sunshine for 7 days. After drying well, the seeds have to be separated from the seedlings. Finally the seeds are stored in jars.

Loomful or Loabana (Spice leaves) Cultivation:

Introduction: 'Loomful' is jum spice leaves. It is little bit similar to Indian curry leaves. It is popular as 'loomful' which is a Chakma word and it is called 'loabana' in Kokborok. It is a favorite spice leaves for the Chakma and the Tripura Communities in Chittagong Hill Tracts. It grows basically in jum field and hilly areas. The plant has its own aura. Traditionally it has been used as a spice to cook meat.

Cultivation period: Jum farmer spreads the seeds in the month of Boishakh (April-May) in jum field and upland areas around the home. The farmer prepares bed mixing soil with ashes and takes around 5 days to germinate seeds. The seeds are to be spread before the first rain pours down the earth.

Cultivation Process: The farmers prepares jum field in the month of Choitra (March-April) and spreads seed in ending of the Boishakh (April-May). It should be spread seeds into ashes and before rain fall.

Harvesting period and Technique: Usually, it becomes mature to harvest in the month of Ashar (June-July) and it can be continued to Ashwin (September-October). The jum farmer harvests or plucks out it manually.

Seeds collection and preservation: Jum farmer collects seeds when the plant turns to grey. The seeds are to be restored along with its branches and while spreading one just needs to hit the branches gently so that the seeds drop on the ashes. The month of Agrahayan is ideal to restore seeds. It takes 3-4 days to dry well and hang near the cooking place.

Jummo Mokke (Jum Maize) Cultivation:

Introduction: 'Jummo mokke' is a Chakma word which means jum maize. It is a favorite crop in Chittagong Hill Tracts. The Chakma, Marma and Tripura communities like to eat it by boiling and making curry. It is different from plane land in terms of flavor, test, soft and stickiness. It is basically a drought tolerant crop which is grown in high land or jum.

Cultivation Process: Jum farmer grows jummo mokke in the month of Boishakh (April-May) in jum field. They prepare jum field in the month of Choitro (March-April) and sow seeds by digging holes along with other crops in early April. Usually, the



Figure 10 An experimental plot of jum maize to plane land

maize flowering starts in the month of Ashar (June-July). Some jum farmers believe that if maize and paddy grow together, paddy may be hampered. For that reason they sow the maize seeds maintaining a distance and sometime they separate from paddy. According to the jum farmers two types of maize found in Chittagong Hill Tracts such as 'bini mokke' and 'boja mokke'. Bini mokke has multi-color and takes around four months to be matured and Boja mokee has white color only and takes around three months to be matured. The jum farmer ensures maturity by scratching on the skin of the maize. If they guess maturity then harvest it for sale.

Harvesting Techniques: Jum farmer harvests it in the month of Shrabon (July-August). The Chakma, Marma and Tripura communities like green maize rather than ripen. Thus, it is better to operate harvesting on the basis of customer and market demand. Usually, the jum farmers harvest it manually.

Seeds collection and Preservation: Jum farmer chooses healthy, intact and big size maize for seeds collection during harvesting. After harvest they dry at sunshine until it properly dried up. Usually, it takes 10-15 days to dry well and stored in a dry place. The farmer hangs the bunch of maize with coating at utto (scaffold) over the cooking place so that the bunch of maize dry properly.

Jummo Verogulo or Dhagasumi or Moirimi (Ladies Finger or Okra) Cultivation:

Introduction: 'Jummo verogulo' or 'dhagasumi' are Chakma words and 'moirimi' is a Tripura word which mean Jum 'ladies finger' or 'okra'. The okra is a favorite vegetable for Chakma, Marma and Tripura communities in Chittagong Hill Tracts. It is different from others in terms of test, flavor, size and color. It is a drought tolerant crop or plants which is grown in jum or high land.

Cultivation Process: Jum farmer grows it in the month of Boishakh (April-May) in jum field. They prepare jum field in the month of Choitro (March-April) and sow seeds by digging holes along with other crops in beginning of April. Usually, flowering starts from early month of Shrabon (July-August) and takes around 5-6 months to turn gray. It starts ripening in the month of Vadra (August-September) after harvesting of paddy. The jum farmer think that if okra and paddy grow together, they get paddy less. That is why they sow its seeds maintaining a distance with paddy. The jum farmers guess maturity by scratching on the skin and staving tail of it. If the farmer thinks that the okra seems to be matured then harvest it for sale.

Harvesting Techniques: Jum farmer harvests okra when it is matured and edible as vegetables. However, harvesting time depends on market demand. Hence, the Chakma, Marma and Tripura communities like green ladies finger as vegetable. Thus, it is better to operate harvesting on the basis of customer demand. Usually, the jum farmer harvests those okra/ladies finger manually.

Seeds collection and Preservation: The jum farmer chooses healthy, intact and big size of okra during harvesting. Then they dry at sunshine until dried well. Usually, it takes 10-15 days to dry well and store in a dry place. The farmer hangs the bunch of okra with coating at utto (scaffold made with bamboo) over the cooking place so that it keeps the seeds dry well.

Bini Dhan, Jum Dhan (Paddy) Cultivation:

Introduction: 'Bini dhan' is a jum variety sticky rice. It grows in jum field. Jum farmer selects site for jum cultivation following traditional rituals. The ritual is based on the Community. Jum farmer collects soil from the jum field and put the soil under pillow while sleeping to monitor a dream of the special night. If

the jum farmer dreamt bad dream i.e. naked person, bad looking person, fire, ferocious animals it indicates that the jum field is not suitable for cultivation. On the contrary, if the farmer dreamt good dream i.e. smiling face, good symbol, ripen jum field etc. it indicates that the jum is suitable for cultivation.



Figure 11 Jum dhan (jum paddy)

PC- Sanchoy Chakma

Cultivation Period and Process: Jum farmer cuts jum field in the month of Poush-Magh (December-January) and cleans it in the month of Falgun-Choitra (February-March). After cleaning the jum field the jum farmer sows Paddy in the month of Boishakh (April-May) using chuchchheng tagol (special tool to hole the top soil) to reduce soil erosion. But if it does not rain, it is sown in the month of Joistha (May-June). However, paddy also grows well in sloping places. Jum farmers sow paddy with a gap of about 6 inches.

Harvesting Period and Technique: Paddy starts ripening at the early of Vadra (August-September). The farmer harvests paddy with 'chari' (sickle) and carry with 'hollong' (traditional basket made with bamboo) to home. Then they trash it by foot and dry paddy at sun shine for 4-5 days. Then they grind paddy with

'dengee'⁶ (traditional rice husking tools). They use 'kula' to separate the rice from husk then they preserve it in 'bareng'⁷ (basket).

Seed Preservation Technique: If the rice is thin inside the paddy, it is considered suitable for seed collection. To preserve the seeds, the color, size and vigor of the paddy are checked. After drying in the sunshine for 5-6 days, it is kept in the sacks. The seeds are stored in Vadra (August-September) and after 6-7 months it becomes suitable for sowing.

Jedena Biji, Krue (Broom Corn) Cultivation:

Introduction: 'Jedena biji' is a jum variety corn which usually grown in jum field. It is called 'broom corn' in English. It is a favorite crop for children in Chittagong Hill Tracts. It is usually used in preparing 'khai' (popcorn). The farmer fries it without oil that is called 'khai'.

Cultivation Period and Process: Jum farmer cuts jum field in the month of Poush-Magh (December-January) and cleans it in the month of Falgun-Choitra (February-March). After cleaning the jum field the farmer sows 'jedena biji' along with paddy in the month of Boishakh (April-May) using chuchcheng tagol (special tool to hole the top soil) to reduce soil erosion. It gives good yield in any soil. This crop requires very little water for cultivation. But sometimes weeds have to be cleared. There are three common varieties of 'broom corn':

- a. **Muoli Jedena:** The sheaf of the broom corn is straight.
- b. **Hugi Jedena:** The sheaf of the broom corn is curved. This type of Broom Corn plant stick can be eaten like sugarcane.
- c. **Dhan Jedena:** The sheaf of the broom corn is straight.

6 A traditional rice husking machine made with wood which is rare in villages.

7 A traditional rice basket made with bamboo.

Harvesting Period and Technique: The farmer harvests in the month of Ashwin-Kartik (September-November) when the seeds are ripen. The farmer cuts the top of the plant then threshes it.

Seed Preservation Technique: After drying in the sun for 5-7 days, the seeds are kept above the cooking place to prevent insect attack.

Jummo Gosse (Jum Sesame) Cultivation:

Introduction: 'Jummo gosse' means jum sesame. It is a favorite crop in Chittagong Hill Tracts. The jummo gosse usually use in preparing 'pitha' (rice cake). Sometime the jum farmer make gosse oil from the gosse seeds.

Cultivation Period and Process: Jum farmer grows it in the month of Boishak (April-May) with paddy in jum field and sows



Figure 12 Jum sesame to plane land

PC: Badhon Areng

seeds in ending of Boishak (April-May). It blooms in the month of Aashwin (September-October) and matured in the month of Agrahayan (November-December). Usually it needs equal place for cultivation. It gives good yields where sunshine is available on the plants from east and west.

Harvesting Period and Technique: Jum farmer harvests it in the month of Kartik (October-November). When the plant is matured then it is tied up with a cane to another plant. After 15 days the plant is completely dried out. To harvest jummo gosse inside of the 'hallong' (traditional basket) is wrapped with cloth. The seeds are shaken and separated from the plant.

Seed Preservation Technique: Jum farmer chooses healthy and intact jummo gosse seeds. The jum farmer also checks the seeds then they make them dry at sunshine until dried well. Usually, it takes 5-6 days to dry properly. Then the farmer wraps up the seeds with cloth and keeps it in dry place.

Nagagosse (Sesame) Cultivation:

Introduction: 'Nagagosse' is a Chakma word which means Naga's sesame. Chakma women make paste by blend then cook it as dal curry (pulse curry). The nagagosse curry is very especial for the Chakma community which taste and flavor also is especial. It is basically grown in jum and high land.

Cultivation Process: The jum farmer grows it in the middle of Boishak (April-May) with paddy in jum field and sows seeds in ending of Boishak (April-May). It blooms in Aashwin (September – October) and becomes matured in the month of Agrahayan (November – December).

Harvesting Techniques: Jum farmer harvests it by cutting down the plant when it is matured.

Seeds collection and Preservation: The farmer chooses healthy and intact seeds. Then they dry it at sunshine until dry well. Usually, it takes 10-15 days to dry properly. Then the farmer wraps up the seeds with cloth and keep it in dry place.

Hej biji or Marku Cultivation:

Introduction: 'Hej biji' is a jum crop like as rice. It is a favorite crop for Chakma and Tripura communities in Chittagong Hill Tracts. The Chakma community taste it occasionally. It is basically grown in jum and high land.

Cultivation Process: Jum farmer sows seeds in the month of Boishakh (April-May) by digging holes separately from paddy following the indigenous knowledge. The farmer cleans and prepares jum field before sowing seeds. Usually, it takes 3-4 months to bloom and takes 8 months for harvesting.

Harvesting Techniques: Jum farmer harvests hej biji when it is ripen. Basically it takes 7-8 moths to be matured. Usually, the jum farmer harvests it manually and thrashed by husking machine.

Seeds collection and Preservation: Jum farmer chooses healthy and intact seeds of it. Then they dry at sunshine. Usually, it takes 10-15 days to dry properly and store in a dry place.

Hon Chol or Maishi (Foxtail or Millet) Cultivation:

Introduction: 'Hon Chol' means millet and somebody it is called foxtail. It is a favorite crop in Chittagong Hill Tracts. The hon chol usually used in preparing payes (rice sweet). It is used occasionally in wedding ceremony, birthday party, social and

religious program. In north east India the hon chol is used as main rice or food.

Cultivation Period and Process: Jum farmer grows the hon chol in the month of Chaitra (March-April). It is grown well in fertile soil. If the jumia keeps fallow the jum field for 3-4 years then it becomes fertile and makes useful for cultivating foxtail or millet. The seeds are germinated as soon as it rains.

Harvesting Period and Technique: Jum farmer harvests millet in the month of Shraban (July-August). Its harvesting method is similar to paddy. First, the Hon's sheaf are cut with a chari (sickle) and kept in 'kallong' (traditional basket made with bamboo). After 3-4 days the Hon is threshed manually. Finally the seeds are grinded by 'dengi' (traditional husking tool). It is very difficult to separate the seeds without using husk.

Seed Preservation Technique: When the seeds are well dried in sunshine for 5-6 days then the seeds are placed in the sacks. The sack is kept tightly tied so that insects cannot attack them.

Jummo Sudo or Kuchlai (Cotton) Cultivation:

Introduction: 'Jummo sudo' means jum cotton or 'karpas' which is a jum crop in Chittagong Hill Tracts. It grows in jum field and hilly areas. The jum farmer grows it along with rice and other crops in jum field. Once, the Chittagong Hill Tracts was famous for cotton or karpas production. During the Mughal regime it was recognized as 'Karpas Mahal' (zone of cotton) in revenue collection's documents. It was renowned as 'Karpas Mahal' since 1715 era according to the Alamgir Muhammad Serajuddin's article⁸.

8 Alamgir Muhammad Serajuddin, "The Chakma Tribes of the Chittagong Hill Tracts in the 18th century," *Journal of the Royal Asiatic Society of Great Britain and Ireland* 1(1984): 90-98.

Cultivation Period and Process: Jum farmer grows 'Jummo sudo' in the month of Boishakh (April-May) with paddy in jum field. The jum farmer prepares jum field in the month of Falgun-Choitra (February-March). After cleaning the jum field the jum farmer sows its seeds along with paddy and other crops in the month of Boishakh (April-May) using chuchchheng tagol (special tool to hole the top soil). The jum farmer uses it to make hoe and weed plants. It basically uses to reduce soil erosion and retain fertility of top soil. The hilly area is generally useful for cotton cultivation but the land height needs to be medium.

Harvesting Period and Technique: Jum farmer harvests the jummo sudo in the month of Kartik (October-November). It is very important to clean the weeds regularly after growing cotton seedlings. Weeds are cleared for the first time 15-20 days after sowing. After 30-40 days in another phase plays a vital role in increasing the yield. With proper care, the cotton plant starts flowering in 45-50 days.

Seed Preservation Technique: After harvest the jum farmer separates the seeds from the cotton then the seeds are well dried in the sunshine for 1-2 days. Then the seeds are preserved in sacks. The sack is kept tightly knotted so that insects cannot attack them.

Shime Alu or Tha Bochok (Cassava) Cultivation:

Introduction: 'Shime alu' is a Chakma word. It is called 'cassava' in Bangla and in English. It is a favorite vegetable for Chakma, Marma and Tripura communities in Chittagong Hill Tracts. It tastes is sweet and delicious. It is a drought tolerant plants and it is grown well at sandy or lumpy soil in jum field or sloping areas of hill.



Figure 13 Shime alu or Tha bochok (Cassava) with leaves

Cultivation Period and Process: The farmer plants shime alu in the month of Chaitra (March-April) by making holes. The shime alu stick or stem cut at 8-10 inches long in size and planted in 6 inches of hole. The distance from one hole to the other is 8-10 feet. Watering is not required for shime alu cultivation.

Harvesting Period and Technique: The farmer harvests it in the month of Kartik (October-November). When the soil is cracked then the farmer guesses that the potato is matured to harvest. Then the Shime Alu is harvested carefully by digging out of the hole with chopper.

Seed Preservation Technique: The shime alu plant is carefully kept by putting in moist soil after harvesting. Then during the cultivation period, the plant is cut into 8-10 inches and planted in the soil maintaining a distance.

Reng/Suchana Cultivation:

Introduction: 'Reng' is a fruit like 'shapeta' in size but it is tasted slightly sweet like potato.

Cultivation Period and Process: The farmer makes small hole and take fallow for certain days for fertile the soil in the month of Baishakh (April-May). Then reng seed put into the soil and a little bit soil cover on the top. It takes about a month for the seedlings to emerge. It is actually a creepy plant. After the seedlings come out, it needs a support of tree or bamboo stick to climb the creeper and the reng plant is hug it.

Harvesting Period and Technique: The farmer harvests the reng in the month of Ashwin-Katik (September-November) which is the best time to be matured reng.

Seed Preservation Technique: To preserve the seeds, the color, size and vigor of the reng are checked. After harvest it is kept in dry place and for long lasting some people put it in sandy soil to control the moist for better germination.

Juro Alu (Jicama) Cultivation:

Introduction: 'Juro alu' is a Chakma word. It is called 'thanda alu' (cool potato) in Bangla and 'jicama' in English. It is a favorite vegetable for Chakma, Marma and Tripura communities. It is different from other ordinary jicama which is grown at river bank of plane land. The experience of its taste is sweet and delicious than others. It is a drought tolerant vegetable and grown at sandy and lumpy soil in jum field or sloping areas of hill.

Cultivation Process: Jum farmer grows juro alu in the month of Boishakh (April-May) in jum field. The farmer makes ready jum field in the month of Choitro (March-April) and sows seeds along



Figure 14 An Experimental plot of Juro alu (jicama) to plane land

with rice and other crops in early of April. It takes around 6-7 months to grow potatoes and around 9 months to get mature seeds. The plant grows fruits look like bean but not edible.

Harvesting period and Techniques: Jum farmer harvests it in the month of Posh (December-January). The Chakma, Marma and Tripura communities like it as salad than curry. Usually, the farmer harvests it when the stem of the vines begins to shrivel then they guess it is matured and perfect time to harvest.

Seeds collection and Preservation: Jum farmer collects seeds from the beans for preservation. It takes 10-15 days to dry. To avoid the losing seeds when it bursts the jum farmer uses net to cover the bean during the sun dry. They preserve the seeds after dried properly in pot or jar and keep it in a dry place.

Mu Alu or Yangni Thaktoi Cultivation:

Introduction: 'Mu alu' is a kind of potato and the taste is slightly sweet and delicious. 'Mu alu' is a Chakma word and in Kokborok it is called 'yangni thaktoi'. This type of potato requires plane land for good yield.

Cultivation Period and Process: The farmer plant 'mu alu' in the month of Chaitra (March-April) putting the seeds of 'mu alu' in a Bung (a round fence with bamboo). Before plant of 'mu alu' seeds, the farmer makes a bung with bamboo fence then filed up it with fertile soil. After the seedlings come out, it needs a support of tree or bamboo stick to climb the creeper and the plant is hug it. Some farmers make hole and plant seeds around the hole with cow dung then the farmer weaves fence around the hole at a height of 3-4 feet. After planting, a tree or bamboo stick is kept in the middle so that the plants can be climbs on it.

Harvesting Period and Technique: The farmer harvests it in the month of Ashwin-Kartik (September-November) when the leaves of the climbers turn reddish yellow, it is considered as a suitable time for harvesting. Mu alu are located at a distance of about 10-12 inches from the plant. A small branch emerges from the plant. The position of the 'mu alu' can be identified by determining the distance of the branches. During harvesting, special care should be taken not to cause any harm to this type of potatoes. Finally the 'mu alu' are carefully dug out of the hole with a chopper.

Seed Preservation Technique: After harvest it is preserved in dry place or corner of the house for long lasting and to control the moist for better germination.

Pile Alu Cultivation:

Introduction: 'Pile alu' is a kind of hill variety of potato and it is tasted slightly sweet. This type of potato requires plane land for good yield.

Cultivation Period and Process: The farmer plants pile alu in the month of Chaitra (March-April) by putting the seeds (face) in soil then the seeds covered with little bit of soil. It is actually like a creepy plant. After the seedlings come out, it needs a support of tree or bamboo stick to climb the creeper and the plant is hug it. **Harvesting Period and Technique:** The farmer harvests it in month of Ashwin-Kartik (September-November) when the leaves of the climbers turn reddish yellow, it is considered as a suitable time for harvesting. Pile alu is located at a distance of about 10-12 inches from the plant. A small branch emerges from the plant. The position of the pile alu can be identified by determining the distance of the branches. Finally the farmer harvests pile alu carefully dug out from the hole with a chopper.

Seed Preservation Technique: After harvest it is kept in dry corner of the house for long lasting and to control the moist for better germination.

Edo Theng Alu or Thaklok (Elephant Foot Yam) Cultivation:

Introduction: 'Edo theng alu' is a hill variety of potato or yam. It is Chakma words which mean elephant foot yam. It is a big and long in size and it shows like elephant foot so that the Chakma community called it 'Edo theng alu'. The Tripura community it is called 'Thanklok' in Kokborok. It tastes is slightly sweet and delicious. This type of potato plants requires sloping and soft land for good yield. If the soil is hard, it becomes very difficult to harvest the potato by dug out from the hole.

Cultivation Period and Process: The farmer plants 'edo theng alu' in the month of Chaitra (March-April) by putting the seeds (face) in soil then covered by soil little bit on it. It is actually like a creepy plant. After the seedlings come out, it needs a support of tree or bamboo stick to climb the creeper and the plant is hug it. **Harvesting Period and Technique:** In the month of Ashwin-Kartik (September-November) when the leaves of the climbing plant turn reddish yellow, it is considered as a suitable time for harvesting. 'Edo theng alu' are located at a distance of about 10-12 inches from the plant. A small branch emerges from the plant. The position of the 'edo theng alu' can be identified by determining the distance of the branches. Finally the 'edo theng alu' are carefully dug out from the hole with a chopper.

Seed Preservation Technique: The farmer choose the 'edo theng alu' which are large in size and have no spots for seeds. Then it is dried in the sun for 3-4 days and kept in a corner of the house.

Adah or Haiching (Ginger) Cultivation:

Introduction: 'Adah' is a Chakma word means ginger. It is cash crop which is used as spice at cooking of meat and fish. It grows in hills and plane land. The local variety is popular in terms of scent and taste. The Chakma community called it 'Adah' and Tripura Community called it 'Haiching'.

Cultivation Period and Process: Jum farmers plant adah in the month of Chaitra-Boishak (March-May) in the jum field along with paddy. On the contrary the ordinary farmer plants it in the month of Chaitra-Boishak (March-May) in plane land and sloping areas of hills. Firstly, they make the soil soft and suitable by spading then they plant adah seeds maintaining a gap of about 6 inches. It requires mujono mati (loamy soil) for cultivation. After planting, the farmer mulches with 'shon' (straw) which is known as 'takke deya' in Chakma dialect. This keeps the soil cool and

moisture. Ginger requires very little water for cultivation. But sometimes weeds have to be cleared.

Harvesting Period and Technique: The farmer harvests adah by dug out the soil carefully with a spade in the month of Ashwin –Kartik (September-November).

Seed Preservation Technique: 'Adah' basically are stored in a 4-5 feet hole outside of the house. The farmers use sand under and beside the hole before putting the adah. Then they mulch sand on top of the hole. The farmers have to be careful enough from rain water so that the adah are kept well and dry. Following this method the farmers can preserve and store in around for 1 year.

Ohlod or Sili (Turmeric) Cultivation:

Introduction: 'Ohlod' is a Chakma word means turmeric. It is a cash crops in Chittagong Hill Tracts which is use as spice at cooking of meat, fish and vegetables. It grows in hills and plane land. The local variety is popular in terms of colour and taste. The Chakma community called it 'Ohlod' and Tripura Community called it 'Sili'.

Cultivation Period and Process: The jum farmers plant the ohlod in the month of Boishak-Joistho (April-June) in the jum field along with paddy. On the contrary the ordinary farmer plants it in the month of Chaitra-Boishak (March-May) in plan land and sloping areas of hills. Firstly, they make the soil soft and suitable by spading then they plant seeds maintaining a gap of about 6 inches. It requires mujono mati (loamy soil) for cultivation. After planting, the farmer mulches with 'shon' (straw) which is known as 'takke deya' in Chakma dialect. This keeps the soil cool and moisture. Ohlod requires very little water for cultivation. But sometimes weeds have to be cleared. The jumia farmers do not use mulching of 'shon (straw) in cultivating jhum turmeric just maintains a gap or distance 'ek hat' (around 18 inches) during showing of seeds.

Harvesting Period and Technique: In generally, there is a practice when the ohlod (turmeric) leaves turn green to yellow, it is time to harvest. Turmeric is collected by dug out from the soil carefully with a spade in the month of Magh (December-February).

Seed Preservation Technique: Turmeric is stored in a cool place outside the house. The jum farmers have to be careful enough not to come in contact with rain water. In this method, turmeric can be stored for up to 2-2.5 months.

Suguri Alu or Misti Alu (Sweet Potato) Cultivation:

Introduction: 'Suguri alu' is a vegetable in Chittagong Hill Tracts. It is a Chakma word. In Bangla it is called 'misti alu'. It grows at sandy soil in the river bank. Its taste is sweet with good flavor.

Cultivation Period and Process: The farmer grows suguri alu in the month of Kartik (October-November) in plane land and river bank. Suguri alu grows well in sandy soil. It is a creepers plant. The farmer ploughs the cultivable land then imbed the root of the suguri alu maintaining a distance of 6-7 inches. After implanted the farmer should watering to ensure the aliveness of roots.

Harvesting Period and Techniques: The farmer harvests the suguri alu in the month of Magh-Falgun (January-March). The farmer harvests it carefully by spading with chopper.

Seed Preservation Technique: The farmer collects and preserves roots as seeds for next time germination. The farmers put it in wet and cool place so that they can pick up roots for next time plantation.



Figure 15 A women in front of her pojok or pui shak or malabar (spinach) garden

Pojok or Pui Shak (Malabar Spinach) Cultivation:

Introduction: 'Pujok' is a green vegetable in Chittagong Hill Tracts. It is a Chakma word. It is called 'Pui Shak' in Bangla and 'Malabar Spinach' in English It grows at homestead and plane land.

Cultivation Period and Process: The farmer grows hybrid pujok in Falgun-Chaitra (February-April) and deshi (local) variety pujok grows in Baishakh-Jaistha (April-June). It is a creeper plant and found two types of pujok one is Hybrid and another is deshi (local). The farmer prepares bed by spading with chopper and mix soil with cow dung and bio fertilizers. Then they sow the seeds in bed maintaining a distance of 2-3 inches from the front and 1 foot from the side. A little bit of soil spread on top of the seed's bed. After that the farmer needs watering to ensure the germination of seeds. On the contrary, deshi (local) pujok cultivated in homestead using cow dung. When the seedlings are grown up then the farmer uses 'gil' (bamboo stick or poles) to climb the plant.

Harvesting Period and Techniques: The farmer harvests the hybrid pujok in the month of Boishak-Joistha (April-June). The farmer harvests it by using 'chari' (stickle) and deshi (local) pujok in the month of Ashar-Shraban (June-August).

Seed Preservation Technique: The farmer collects hybrid seeds from the market and deshi (local) pujok seeds collect from healthy plant. Finally the seeds are dried in the sun and wrap with cloth and preserve it in pot or jars.

Rei Shak, Sojjo Shak or Sorisha Shak (Mustard Leaves) Cultivation:

Introduction: 'Rei' or 'Sojjo' is a Chakma words means mustard leaves. In Bangla it is called 'Rai' or 'Sorisha Shak'. It is an important cash crop in the Chittagong Hill Tracts. Its leaves is used as green vegetable and seeds are used as source of oil. It grows at cultivable and plane land.

Cultivation Period and Process: The farmer grows mustard crop in the month of Kartik (October-November). At first, the farmer ploughs the cultivable land and soil mix with the cow dung. Then the farmer spreads or sows seeds in the soil. It does not require much water for cultivation.

Harvesting Period and Technique: The farmer harvests the rei or sojjo crop in the month of Magh-Falgun (January-March). The farmer harvests it by using chari (sickle). The plants or creepers become edible after one month of germination.

Seed Preservation Technique: The farmer selects healthy plant for seed collection. When the seeds are matured in the month of Magh-Falgun (January-March) the farmer collects seeds and thresh. Then the seeds are well dried in the sun. After well dried the farmer wraps it with cloth and puts inside the 'dulo' (basket made with bamboo) and hung on the cooking place.

Mares Dadi or Data Shak (Stem Amarnath leaves) Cultivation:

Introduction: 'Mares dadi' is a vegetable which is called 'Data Shak' in Bangla and Stem Amarnath leaves in English. It grows well at homestead and plane land.

Cultivation Period: The farmer grows mares dadi in the month of Kartik (October- November). At first, the farmer ploughs the cultivable land and soil mix with the cow dung. Then the farmer spreads or sows seeds in the soil.



Figure 16 Mares dadi (Stem Amarnath leaves)

Harvesting Period and Technique: It becomes edible after 30-45 days of germination. During harvesting, the whole plant is uprooted.

Seed Preservation Technique: The farmer selects healthy plant for seed collection. When the seeds get matured then the farmer collects seeds and thresh. Then the seeds are well dried in the sun. After well dried the farmer wraps it with cloth and put inside the 'dulo' (basket made with bamboo) and hung on the cooking place.

Amile pada (Rosella Leaves) Cultivation:

Introduction: 'Amile pada' is a vegetable leaves which is very popular in the Chittagong Hill Tracts. It is basically used to make soup with dry shrimp and 'Chidol' (nappi/shrimp pest). It is a Chakma word, in Bangla it is called 'Amile Pata' and in English it



Figure 17 Amile pada (rosella leaves) PC Sanchoy Chakma

is called 'Rosella Leaves'. It grows at jum field and around homestead areas in Chittagong Hill Tracts. Not only Chittagong Hill Tracts it is found in India, Nepal, Thailand, Myanmar, Cambodia, Laos and Vietnam also.

Cultivation Period and Process: This crop grows in the month of Baishakh (April-May) in the jum field. But in homestead, the amile pada grows in the month of Falgun-Chaitra (February-April). In jum the farmer grows amile pada along with paddy. On the other hand, in homestead the farmer sows amile pada by spading the seeds beds and of course the soil mix with cow dung. Then the seeds are scattered in the beds.

Harvesting Period and Technique: Jum farmer harvests amile pada in the month of Poush-Magh (December-February) and ordinary farmer harvests it after 20-25 days of germination. However, the farmer has to wait for 5-6 months to collect the seeds.

Seed Preservation Technique: When the seeds are matured, they are separated from the plant after drying. Then it is wrapped with cloth, put inside the 'dulo' (basket made with bamboo) and hung on the cooking place.



Chapter-2 BHUI (PLANE LAND) CROPS



Chal Humoro (Wax Gourd) Cultivation:

Introduction: 'Chal humoro' is a Chakma word means wax gourd. In Bangla it is called 'Chal Kumra'. It is a popular vegetable. It grows well at cultivable and plane land.

Cultivation Period and Process: The farmer grows 'Chal humoro' in the month of Baishakh (April-May). At first the farmer prepares seeds bed mix with cow dung. Then the seeds are sown in the bed. It germinates after 4-5 days. When the climbers grow up then the farmer makes 'maja' (scaffold) to climb up well. If insects attack the plant, then the farmer uses ashes.



Figure 18 A scaffold of chal kumoro (wax gourd) PC Minuching Marma

Harvesting Period and Technique: The farmer harvests 'chal humoro' in the month of Shraban-Bhadra (July-September) when the fruit is matured and edible as vegetable.

Seed Preservation Technique: The farmer selects healthy 'chal humoro' which is large in size and healthy in shape. When the skin of the 'chal humoro' is hard and white in color, the seeds are separated from the fruit. Finally the seeds are well dried in the sun and wrapped with the cloth and put inside the 'dulo' (basket made with bamboo) and hung on cooking place.

Fol or Shasha (Cucumber) Cultivation:

Introduction: 'Fol' is a Chakma word. It means Cucumber. It tastes like muskmelon but when ripe it tastes slightly sour and sweet. It grows in plane land.

Cultivation Period and Process: The farmer grows fol in the month of Chaitra-Baishakh (March-May). At first, the farmer makes bed mix with soil and cow dung then sows seeds in beds. It takes 5-10 days to germinate. When the plants grown up, the farmer makes maja (scaffold with bamboo) to climb for the plants. The farmer uses ashes as fertilizer and pesticide by spreading the ashes.

Harvesting Period and Technique: Usually within 2 months, the farmer can start to harvest it. After one month of germination the fruit became edible and it takes 45-60 days to collect ripen fol.

Seed Preservation Technique: The farmer selects the fol which are big in size and healthy for seed collection. Then they harvest the fol and collect seeds. Then the seeds dried well in the sun. Finally they preserve it wrapped with cloth and put inside the 'dulo' (basket made with bamboo) and hung on the cooking place.

Bilidi Alu (Potato) Cultivation:

Introduction: 'Bilidi alu' is a popular vegetable in Chittagong Hill Tracts. It is a Chakma word which means foreign potato. In Bangla it is called 'Gol Alu'. It grows at sandy soil in the river bank. Its taste is sweet and delicious with good flavor.



Figure 19 They are sowing potato seeds in field

Cultivation Period and Process: The farmer grows 'Bilidi alu' in the month of Kartik (October-November) in plane land and river bank. This type of potato requires sandy soil for cultivation. Because, it is roots vegetable and need sandy soil to grow and production more. For the cultivation processes, the farmer ploughs the cultivable land then sows potato seeds in row mix with cow dung and ashes. It takes 20-25 days to germinate the seeds after sowing it. When the seedling is grown up that time the farmer spades the row and builds Aail (earthen dam) both sides of the row. Then the seedlings need watering. After 30-45 days need watering again when the soil seems dry. Then need a little bit spading into row on both sides to loose the soil to grow up the seedling fast.

Harvesting Period and Techniques: The farmer harvests 'Bilidi alu' in the month of Magh-Falgun (January-March). The farmer harvests it carefully by spading with chopper.

Seed Preservation Technique: The farmer collects seeds medium size potatoes as seeds for next time germination. Then they preserve it in cool and dry place with sand in a house.

Motor biji (Green Pea) Cultivation:

Introduction: 'Motor biji' is a Chakma word means green pea. In Bangla it is called 'Motor'. It is an early spring vegetable so that it is easy to grow in any place. It grows in whole over the Bangladesh. It can make varieties items of food. It grows well at cultivable plane land.



Figure 20 Ms. Apruma Marma in her pea's field, Dakkhin Golabari, Khagrachari Sadar upazila

Cultivation Period and Process: The farmer sows 'motor biji' in the month of Kartik (September-October) so that the plants can be matured while the weather is still cool. At first, the farmer ploughs the land after that they sows the seeds in line or row maintaining a distance of 18 inches in each line or row. When the plants are grown at 6 inches tall, the farmer spades in both side of the line or row to loose the soil so that the plant get enough nitrogen and nutrition from the soil. After that the farmer waters the plants to grow up well. The plants require little extra fertility to grow and produce pods. Thus, the farmer uses fertilizer and pesticide to get more productions. Before sowing pea's seeds the farmer should be careful to choose the seeds which are healthy for germination.

Harvesting Period and Technique: The farmer harvests 'motor biji' when the skin of it turns green during the month of Poush-Magh (December-February) and considered as the time for harvesting. Again, when the Pea's skin turns white, it becomes mature. The motor plants do have limited growing season so that motor (peas) do not stay long fresh after harvest. Thus, the farmer should more careful to harvest the peas.

Seed Preservation Technique: The farmer selects the 'motor biji' which are big in size and healthy for seed collection. Then they collect seeds and trashed. Then seeds are well dried in Sunshine until hard and dry. It takes 15-20 days to a month for the seeds to dry well. Finally the seeds are preserved in Lei (basket made with bamboo) and kept it in dry place inside of the house.

Hogeye (Papaya) Cultivation:

Introduction: 'Hogeye' is a Chakma word means 'Papaya'. In Bangla it is called 'Pepe'. It is a popular fruit and vegetable. It grows well at homestead and cultivable plane land.

Cultivation Period and Process: The farmer sows hogeye seeds in the month of Chitra-Baishakh (March-May). Usually hogeye seeds are sown in fertile soil. The farmer digs hole and makes fertile by putting bio fertilizer, wastage vegetables and rubbish. When the hole becomes fertile then the farmer sows hogeye seeds for germination. The farmer takes care of the plant and keep watering on it regularly for grown up the plants. They use ashes bio-pesticide to control the insects.

Harvesting Period and Technique: The maturity of the fruits depends on the growth of the plant. Generally, in the month of Kartik-Aghrahan(October-December) when the hogeye's



Figure 21 A farmer with his papaya garden

colour becomes into reddish yellow then the farmer consider as the harvesting time.

Seed Preservation Technique: The farmer select healthy and big size hogeye for seed collection. After harvest and having the hogeye they collect seeds and dried well in the sun. Finally the seeds are preserved in 'ludung' (traditional pot made with gourd) and kept it on cooking place inside of the house.

Hudugulo (Bottle Gourd) Cultivation

Introduction: 'Hudugulo' is a Chakma word means 'Bottle gourd'. In Bangla it is called 'Lau'. It is a popular vegetable. It grows well at cultivable plane land. The hudugulo is an early spring vegetable so that it is easy to grow in any place. It grows in whole over the Bangladesh.



Figure 22 Ms. Chingnu Marma in her vegetable garden, Mrachanai para, Bhaibonchara union, Khagrahari sadar upazila.

Cultivation Period and Process: The season of growing hudugulo's seeds is in early January so that they become matured while the weather is still cool. Firstly, the farmer makes cleaned land and makes bed for sowing the hudugulo's seed in January. When grow up the plant then the farmer makes 'maja' (scaffold) to climb the plant. Before sowing seeds the farmer carefully chooses the seeds which are healthy for germination. The farmer uses fertilizer and pesticide to get more productions. **Harvesting period and Technique:** The farmer harvest hudugulo in the month of March when the fruit is matured and edible as vegetable.

Seed Preservation Technique or Method: The farmer basically follows the traditional technique to collect seeds. At first they mark the bottle gourd which one is big size and healthy then they are given priority to well matured one without any infection by insects. Seeds are well dried in the sun until they are hard and dry after collection. It takes 15-20 days to a month for the seeds to dry well.

Horohbegun (Tomato) Cultivation

Introduction: 'Horohbegun' is a Chakma word means 'Tomato'. In Bangla it is called 'Tok Begun'. It is a popular as Tomato. It grows well at cultivable plane land. It is an early spring vegetable so that it is easy to grow in any place. It grows in whole over the Bangladesh.

Cultivation Period and Process: The season of growing horohbegun's seeds is in late February to early March so that they become matured while the weather is still cool. Firstly, the farmer makes the land cleaned and makes bed in late February and sows the horohbegun's seed in early March. When the plant is grown up then the farmer waters and uses fertilizer and pesticide for more production. Sometime they use bamboo's



Figure 23 Ms. Neuching Marma in her vegetable field, Ramesh karbari para, Khagrachari sadar Upazila.

fencing and net to protect the vegetable eating from cows and goats. Before sowing seeds the farmer should carefully choose the seeds which are healthy for germination.

Harvesting period and Technique: The farmer harvests horohbegun when the fruit becomes red. Basically the farmer harvests in the month of May.

Seed Preservation Technique: The farmer selects the horohbegun which are big in size and healthy for seed collection. Then they collect seeds and dry it at sunshine. It takes 4-5 days to dry well. Finally the seeds are preserved in 'ludung' (traditional basket made with gourd) and kept it in dry place inside of the house or near the cooking place to keep it dry.

Seed Preservation Technique or Method: The farmer basically follows the traditional technique to collect tomato seeds. They

select the tomato's plant which one is big size and healthy tomatoes without any infection by insects. Then they collect and preserve the seed with well dried in the sun until they are hard and dry. It takes 5-7 days to dry well.



Figure 24 A traditional basket or pot 'Ludung'

Bana Kobi (Cabbage) Cultivation

Introduction: 'Bana Kobi' is a Chakma word means cabbage. In Bangla it is called 'Banda kopi'. It is a popular vegetable. It grows well at cultivable plane land. It is an early spring vegetable so that it is easy to grow in any place. It grows in whole over the Bangladesh.

Cultivation Period and Process: The season of growing bana kobi's seeds is in late February to early March so that they become matured while the weather is still cool. Firstly, the farmer makes cleaned land and makes bed in late February and sows the bana kobi's seeds in early March. When grow up the plant then the farmer has to water and uses fertilizer and pesticide for more production. Sometime they use bamboo's fencing and net to protect the vegetable eating from cows and goats.



Figure 25 Ms. Neuching Marma in her vegetable field, Ramesh karbari para, Khagrachari sadar Upazila.

Harvesting period and Technique: The farmer harvest bana kobi when it becomes mature and edible. Basically the farmer harvest in the month of May.

Seed Preservation Technique: The bana kobi does not give seeds so that the farmer collect seeds from market.

Seed Preservation Technique or Method: The farmer collects seed from markets.



