Final Report

Feasibility study for conservation of vulnerable species of Manang District, Nepal

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Abstract

Vulnerable species are key to biodiversity conservation. If these species and their habitat were conserved, other species could be conserved automatically. Most of vulnerable species are Non-Timber Forests Products (NTFPs). NTFPs are very much valuable than wood products due to low in volume and high in price. In Nepal, several NTFPs are available due to high variation in climate and elevation. The management of NTPFs are hindering due to lack of scientific information about them. This study prepared the distribution map of Guchhi Chyau, Lauth Salla, Nirmansi, Okhar, Sungandhawal. This study hasalso identified the suitable habitat of five NTFPs (Satuwa, Ban Lasun, Panchaule, Lokta and Chiraito) from Manang district of Nepal. Suitable habitats for the NTFPs were modeled by the help of Maximum Entropy (MaxEnt) modeling by using the presence points and environmental variables. The environmental variables were downloaded from freely available sources and processed in ArcGIS. The study identified 92.40, 16.85, 144.63, 6.32 and 25.06 km² of suitable habitat of Ban Lasun, Lokta, Panchaule, Satuwa and Chiraito respectively in Manang district of Nepal. The Manang district is providing more habitats for Panchaule than for other NTFPs. The identified habitats should be conserved for sustainable harvesting of the NTFPs in Manang district of Nepal.

Keywords: Feasibility, Conservation; Management; Modeling;NTFP; Suitable habitat, Vulnerable



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1.Introduction

Vulnerable species are key to biodiversity conservation. If these species and their habitat were conserved, other species could be conserved automatically. Most of vulnerable species are Non-Timber Forests Products (NTFPs). Non-timber forest products (NTFPs) are any product or service other than timber that is produced in forests. They include fruits and nuts, vegetables, fish and game, medicinal plants, resins, essences and a range of barks and fibers such as bamboo, rattans, and a host of other palms and grasses.

Over the past two decades, governments, conservation and development agencies and nongovernment organizations have encouraged the marketing and sale of NTFPs as a way of boosting income for poor people in the tropics and encouraging forest conservation.

But different users define NTFPs differently, depending on their interests and objectives. At CIFOR, the emphasis is on understanding how people use forest resources, and on helping to improve the contribution these resources make to the livelihoods of the world's rural poor. Accordingly, CIFOR uses an inclusive definition of NTFPs — one that even encompasses wood products, such as those used for woodcarving or fuel.

NTFPs are used and managed in complex socio-economic and ecological environments. In traditional forest communities, many NTFPs may be used for subsistence while others are the main or only source of income. Some NTFPs have significant cultural value, as totems, incense, and other ritual items. Others have important medicinal value and contribute to the community's health and well-being.

But as forest areas shrink, human populations grow, markets change, and traditional management institutions lose their authority, the sustainable production of many NTFPs is no longer assured. For example, as international rattan prices increased in the 1980s and '90s, commercial companies in Asia hired local people to harvest available resources. Widespread over-exploitation resulted and in many places the resource was destroyed, affecting the local biodiversity and leaving the people without an important source of income.



While commercial NTFPs can be of considerable value to poor people, it is important to recognize the constraints that exist outside the mere collecting and harvesting of NTFPs. Poor people are poor because they have limited access to markets, insufficient capital and generally weak bargaining power. Some NTFPs may offer employment and income generating opportunities. But realizing this potential will require investing in other areas as well, such as micro-finance schemes, transport and training. It is also important to understand how the whole NTFP chain operates, from raw material production to the final market, to identify bottlenecks and understand their potential (CIFORE, 2018).

This study prepared the distribution map of Guchhi Chyau, Lauth Salla, Nirmansi, Okhar, Sungandhawal. This study has also identified the suitable habitat of five NTFPs (Satuwa, Ban Lasun, Panchaule, Lokta and Chiraito) from Manang district of Nepal.

1.1 Objectives General objective

The general objective of the study is to conduct the feasibility study for conservation of vulnerable species of Manang District, Nepal

Specific objectives

- To identify the suitable habitat of vulnerable plant species in Manang district, Nepal
- To visualize the suitable habitat of vulnerable plant species of Manang district, Nepal in Map
- To identify the important variables of determining the suitable habitat of vulnerable plant species



2. Materials and methods

2.1 Study area

Feasibility study for conservation of vulnerable species of Manang District, Nepal was conducted on Manang district, Nepal (**Figure1**). Manang district a part of Gandaki Province is one of the seventy-seven districts of Nepal. The district, with Chame as its district headquarters, covers an area of 2,246 km² and had a population (2011) of 6,538. The pass of Thorung La at 5415 meters above the sea connects the district to Mustang District by providing a route between the towns of Manang and Muktinath. Manang district gets least amount of rainfall among districts of Nepal as it lies to the north of the Himalayas which blocks monsoon air. The Manang Valley, which lies close to the Nepal-Tibet border, offers tremendous opportunities due to its rich natural flora and fauna. Three tracks start from here. The first, via Thorangla, Muktinath, and Mustang to Lhasa—a journey that takes four days; the second via Naur Khola and Naurgaon, which takes five days to Lhasa; and finally the third via Larkiya bazar, which is the one most commonly used by the people of Central Nepal.

Along with the Marwaris who have migrated from India to Nepal in large numbers, the Manangies are the best known traders of Nepal. They have received special dispensation from the King to trade in South East Asia, and travel abroad with precious stones and metals, musk, herbs and other items. They import ready-made garments, watches and electronic goods. Many of the Manangies spend as much as six months away from home, returning only during the summers. Many of them reside in Kathmandu, where their children study in the English medium schools. The parents' lack of proficiency in the English language is irrelevant as it in no way affects their trading skills. Since the area was opened to outsiders in the late 1970s, many have switched from the traditional agriculture to hotel earing. The trail from Manang to Muktinath has been used by the locals for hundreds of years to transport huge herds of sheep and yak in and out of Manang. It is an important route for the people of the region. The northern parts of Manang Valley are dry, brown and desolate places, very different from the thick forests and brown green valleys of Sikkim and Eastern Nepal.





Figure 1: Study area in Nepal

2.2 Plot design and data collection

The study team visited all potential habitats of vulnerable species from April to June 2020 throughout the study area to search for these species. First of all we found out the information of vulnerable species from herders. Then we requested to them to show the plant of vulnerable species. Finally we have visited the habitat of vulnerable plant species. During the data collection process the villagers/herders who helped us to show the habitats were benefited by wages. We have collected 286 occurrence points of vulnerable plants and NTFP in the study area.



2.3 Environmental variables

2.3.1 Topographical variables

The topographical variables were used for the habitat modeling of the species for 20 years (Osborne et al., 2001). Digital Elevation Model (DEM) of 30 m resolution was downloaded from USGS website (https://earthexplorer.usgs.gov/), and slope was calculated from the DEM using ArcGIS software (ESRI, 2017).

2.3.2 Vegetation-related variables

Vegetation-related variables are important variables responsible for the existence of the herbivores (Andersen et al., 2000). The NTFPs are plants so the inclusion of vegetation-related variables to the model is a prerequisite for the robust modeling. Therefore, we used Enhanced Vegetation Index (EVI) to model the suitable habitat for NTFP. We downloaded EVI time series data from 2015, 2016, and 2017 from the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor from the website of USGS. We then used ENVI software to smooth the data by using an adaptive Savitzky-Golay filter in TIMESAT program (Jönsson and Eklundh, 2004)to reduce the cloud effect, and subsequently to obtain meanand standard deviation of EVI.

2.3.3 Anthropogenic variables

During the field data collection also, human activities were recorded inside the habitat NTFP species. Therefore, anthropogenic variables were added for the robust modeling. We obtained the shapefile of paths and motor roads inside the study area from the Geofabrik (<u>https://www.geofabrik.de/data/shapefiles.html</u>) website. Settlement locations were available from Department of Survey, Nepal. Distance raster files of paths and settlements were created by using ArcGIS (ESRI, 2017). We downloaded also data related to land cover and land usefrom the website of International Centre for Integrated Mountain Development website (ICIMOD;



http://www.icimod.org) (Uddin et al., 2015) and included to the model.

Source	Category	Variable	Abbreviation	Unit
		Elevation	elevation	m
USGS	Topographic	Aspect	aspect	Degree
	Topographic	Slope	slope	Degree
GEOFABRIK		Distance to water	dist_water	m
		Mean EVI	evimean	Dimensionless
	Vegetation- related	Maximum EVI	evimax	Dimensionless
MODIS		Minimum EVI	evimin	Dimensionless
		Standard deviation of EVI	evisd	Dimensionless
GEOFABRIK	Anthropogenic	Distance to settlement	dist_settle	m
		Distance to motor road	dist_motor	m
		Distance to path	dist_path	m
ICIMOD		Land use/land cover	landcover	m

Table 1: Environmental variables used for modeling

2.4 Prediction of suitable habitat of NTFPs

We performed species distribution modeling in study area based on the geo-referenced presence points of the NTFPs. Environmental variables (elevation, slope, land use land cover, distance to path, distance to motor road, EVI, distance to water and land use land cover) were used as an



input variable to the MaxEnt modeling to find out predictive distribution map (potential habitat)(Elith et al., 2006; Phillips et al., 2017, 2006) in Manang district of Nepal. This model is widely used model to model the suitable habitat for wildlife and to find out the important variables and their impact on the suitable habitat in Nepal (Panthi, 2018). The model was validated by the help of area under the receiver-operator curve (AUC) and evaluated by True Skill Statistics (TSS) (Merow et al., 2013; Phillips et al., 2006). Data of land cover were downloaded from website of International Center for Integrated Mountain Development (ICIMOD) and data related to elevation (DEM) and Enhanced Vegetation Index (EVI) were acquired from United Geological Survey (USGS) website States (https://earthexplorer.usgs.gov/). This is an established method to identify the potential habitats and to predict the distribution of this and similar species and implemented in several parts of the world (Nazeri et al., 2012; Li et al., 2011). The roads, paths and water channels were downloaded from the website of GEOFABRIK (geofabrik.de/data/shapefiles.html) and distance raster files were created in ArcGIS. The settlement points were obtained from the Department of Survey, Nepal and distance file was generated in ArcGIS.

2.5 Distribution mapping

Distribution mapping of the vulnerable plant species were prepared in the GIS platform. Species which are not distributed throughout the study area, distribution maps of these species were prepared. Occurrence points of these species are not distributed in scatter pattern.



3. Results and discussions

3.1 Panchaule (Dactylorhiza hatagirea)

3.2.1. Introduction

Panchaule is a species of orchid generally found growing in the Himalayas, from Pakistan to SE Tibet, at altitudes of 2,800–4,000 metres (9,200–13,100 ft). It is locally called 'Salam Panja' or 'Hatta Haddi'. It is called 'Panchaule'in Nepali and Himalayan regions. The name 'Panchaule' (meaning 5 fingered hand) arises from its root resembling fingers of hand with around 3-5 fingers. It is an erect perennial herb with long flowering stems. The plant is well known for its medicinal value. The root has sweet taste. It is strictly prohibited for collection and sale, but can be found easily around Nepal. It costs around NRs. 10,000-15,000 per kilo as of late 2015 (Wikipedia, 2018).

3.2.2 Uses

The Juice extracted from tuber is used as tonic and also used for the treatment of pyorrhea (inflammation of the gum & teeth). Root paste is externally applied as poultice on cuts and wounds and extract is given in intestinal disorders. The term Hatta Haddi is probably coined because it is used for treating bone fractures (Wikipedia, 2018).

3.2.3 Habitat

As it is highly traded in the name of 'Panchaule' or 'Salampanja' and found in wild, is being unscientifically collected for its commercial importance. *Dactylorhiza hatagirea* is native of the Himalaya. It is found throughout from west to east at temperate to subalpine biocliates within 2800 – 4000 m altitude. Flowers spotted rosy-purple in a terminal spike, borne on a robust leafy stem. It has palmately lobed root tubers, grows well in moist places, open areas, shrub land and open meadows (Wikipedia, 2018).



3.2.4 Conservation

Dactylorhiza hatagirea is endemic to the Hindu- Kush Himalaya. It is categorized as endangered in CAMP Pokhara (2001) conservation list, and strictly banned for collection, utilization and sale (strictly protected species list I GoN, 2001, 2005), and listed in appendix II for control trading (CITES – 1974) (Vij, 1992; Rawat, 2005; Bhatt, 2005).

3.2.5 Suitable Habitat

During the study, we have identified 144.63 km² suitable habitats for Panchaule in Manang district. This is 6.44% of total area of district (**Figure 3**).







3.2Satuwa (Paris polyphylla)

3.1.1 Introduction

Paris polyphylla is an Asian species of plants native to Nepal, China, Taiwan, the Indian Subcontinent, and Indochina. It produces spider-like flowers that throw out long, thread-like, yellowish green petals throughout most of the warm summer months and into the autumn. In the fall, the flowers are followed by small, scarlet berries. It is a perennial, which slowly spreads, is fully hardy in Britain, and survives in leafy, moist soil in either complete or partial shade. This flowering plant usually grows up to 90 cm (3ft) high and spreads out about 30 cm (1ft) wide. Its leaves grow in a single whorl below a flower growing in two whorls.

The generic name Paris is derived from the word pars, or equal, which refers to the symmetry of the plant and the multiples of four in which its foliage, flowers, and fruits grow (Burnett and Thomas). The specific epithet, polyphylla, refers to the plants' many broad leaves: "many (poly) leaves (phylla)" *(Steward*, 1958). It is also referred to as Ch'i Yeh I Chih Hua in China, meaning "seven-leaves-one-flower". Its Nepali name is Satuwa, and it is referred to as the "Love Apple" in English.

3.1.2 Habitat

Paris polyphylla prefers to grow in forests, bamboo forests, thickets, grassy or rocky slopes and stream sides (*Liang et al., 1994*). It likes moist, damp, and shady places (such as under deciduous trees). It is said to grow at altitudes up to 3300 meters and thrives well in places with moist and humus rich soil under canopy of forest in full shade to partial shade (KC et al., 2010).

Soil nutrients like organic matter, nitrogen and phosphorus were found in higher levels in areas where the plant was absent (KC et al., 2010). However, the levels of phosphorus tended to be found in higher levels in areas were the plant grew (KC et al., 2010).

Conservation and cultivation

Paris polyphylla Sm. (Satuwa) is one of the medicinal plants listed as vulnerable by the IUCN(KC et al., 2010). Seed viability was found to be low and the seeds did not germinate in laboratory conditions even under different chemical treatments (KC et al., 2010). There seems to



be a need for raising awareness amongst people who live in environments in which *Paris polyphylla* propagates (KC et al., 2010). Scientists must make known the sustainable use of the rhizome and its cultivation practice for the conservation of this plant (KC et al., 2010). If some part of the rhizome containing the bud is left underground, it is thought that the plant would become more sustainable and would help in conserving its population in the future (KC et al., 2010).

In a study done in Nepal, it was observed that overharvesting, unscientific collection of rhizomes, harvesting of plants before seed maturity, low viable seed production and long dormancy of seeds are the major threats to the plant's propagation (KC et al., 2010).

Paris polyphylla is considered to be a traded plant and it might have become less abundant in the past decade and this could be due to deforestation (Coward 1999).*Paris polyphylla* plants are supposed to be planted with the pointy shoot at one end of the rhizome facing upwards. The rhizome is then supposed to be covered with around 5 cm (2 in) of humus-rich soil which should not be allowed to dry out during the summer months. In the autumn, a generous layer of mulch should be added and the plants should be left undisturbed after that so that they can increase in number year after year. Caution should be taken since if eaten raw, the leaves of *P. polyphylla* could be toxic, even though it can be used in many medicinal remedies.

3.1.3 Cultivation

In the different varieties of *Paris polyphylla*, there are as many stamens (usually eight) as there are outer tepals, or there could be more (*Liang et al. 1994*). Stamens have short filaments. The filaments are about 10 mm in size, while the anthers are about 12 mm (*Liang et al. 1994*). The ovary is subglobose, ribbed, one-loculed and sometimes tuberculate (*Liang et al. 1994*). The style is short with an enlarged base and purple to white in color (*Liang et al. 1994*). The capsule, which is a kind of dry fruit produced by many flowering plants, is globose and sometimes tuberculate (*Liang et al. 1994*). The plant was found to reproduce mainly by vegetative propagation in the field (KC et al., 2010).^[11]

It has been observed that *Paris polyphylla* seeds produce primary root about seven months after sowing and then leaves about four months later in the second year (KC et al., 2010). The seeds of this plant can remain dormant and this is thought to be because of changes of several endohormones, development of inhibiting substances, and the increase in material



accumulation during the embryo's physiological ripening period (KC et al., 2010). A single offspring is grown from a single mother plant and this led to a rapid decline in its numbers (KC et al., 2010).

3.1.4 Morphology

Plants of *Paris polyphylla* usually grow about 10–100 cm tall from a rhizome 1–2.5 cm thick (*Liang et al. 1994*). The leaves, which are in a whorl at the top of the stem are sessile, petiolate, lanceolate, to ovate or elliptic. The ovary is in the superior position, with numerous ovules (*Hutchinson, 1973*). The fruit is a berry or berrylike capsule, in which the seeds are enclosed in a red succulent aril when ripe (*Liang et al. 1994*). The species is extremely polymorphic (*Hutchinson, 1973*). A table of some characteristics of some varieties of *Paris polyphylla* follows (*Liang et al. 1994*).

Leaves are found in a whorl of 4 to 9 leaves and they are petioled (4–6 cm), oblong, or lanceolate, acuminate. The base of the leaf is rounded to cuneate in shape(*Liang et al. 1994*). In variety *polyphylla*, the leaves are 2.5–5.0 cm wide(*Liang et al. 1994*). The dull-green leaves contain three primary veins and spread out in a horizontal whorl at the top of the stem (*Burnett, 1852*). The leaves are known to have a narcotic odor (*Burnett, 1852*).

Rhizomes, which are stems of plants that usually grow underground and send out roots and shoots from their nodes, grow in a creeping manner (*Burnett, 1852*). The stem grows about a foot high and it is simple, erect, smooth, round and naked, except at the top (*Burnett, 1852*). It is relatively thin.

The tepals, which are elements of the perianth that includes the petals and the sepals, are usually 3–5 mm in length, widen distally, and are narrowly spatulate*Liang et al. 1994*. This is true of the variety *yunnanensis*. The outer tepals are green or yellow-green, narrowly ovate-lanceolate to lanceolate, while the inner tepals are usually yellow-gren, narrowly linear, and are shorter or longer than outer ones (about 1.5 mm long) (*Liang et al. 1994*). In the variety *polyphylla*, the inner tepals are 1–2 mm wide and are slightly longer than the outer ones (*Liang et al. 1994*). In this variety, the bisexual flower is solitary and is produced on an erect angular peduncle and it is about 2.5 cm long (*Burnett, 1852*). The calyx consists of four lanceolate green leaves, while the corolla consists of four linear acute ones, of a similar color. Both the calyx and the corolla remain on the plant until the fruit ripens (*Burnett, 1852*). The fruits are purplish-black



four-celled berries, which contain, in each cell, six or eight seeds in a double series (*Burnett*, 1852). The seeds are surrounded by a red, succulent aril, which will grow in the Spring(*Liang et al. 1994*).

3.1.5 Suitable Habitat

During the study, we have identified 6.32 km² suitable habitats for Satuwa in Manang district. This is 0.28% of total area of district (**Figure 2**).



Figure 3: Suitable Habitat for Satuwa

3.3 Ban lasun (*Lilium nepalense*)

3.3.1 Introduction

Perennial herb growing up to 75 cm. Leaves linear, lower leaves opposite, upper leaves whorled,

3 to 5 in number. Flower solitary, dropping, yellowish with dark purple spots. Lilium



nepalense (common name Lily of Nepal) is an Asian plant species in the lily family. It is native of the Himalayas and nearby regions: northern Thailand, northern Myanmar, Assam, Bhutan, Sikkim, Nepal, Uttarakhand, Tibet, and Yunnan. It can be found growing on wet forest borders at 1,200 to 3,000 m (3,900 to 9,800 ft).

Lilium nepalense grows up to about 1 m high, usually less. The bulbs are stoloniferous, and for newly planted bulbs, the shoot will often come up some distance from the planting spot. Flowers are few, often solitary, pendant, pale green with a purple throat. The flowers are generally unscented during daylight hours and heavily scented after dark (Wikipedia, 2018).

3.3.2 Cultivation

In cultivation, *L. nepalense* is best suited to a cool glasshouse, preferring a slightly acidic, humus rich soil that is well drained. It prefers the bulb to be kept cool while the plant itself can stand full sun. The plant should be well watered in spring, simulating a snow melt. After flowering, the plant should be kept fairly dry or the bulb will rot. Harvesting time is September to October (Wikipedia, 2018).

Description of traded part:

Bulb resembles garlic clove; small and slightly brown in color. It has strong and bitter taste.

3.3.3 Uses

It is used to treat Asthma, Bronchitis and Tuberculosis.

3.3.4 Suitable Habitat

During the study, we have identified 92.40 km^2 suitable habitats for Ban Lasun in Manang district. This is 4.11% of total area of district (**Figure 4**).





Figure 4: Suitable habitat for Ban Lasun

3.4 Lokta (Daphne bholua)

3.4.1 Introduction

Lokta the Nepalese paper plant, is a species of flowering shrub in the genus *Daphne* of the family Thymelaeaceae. It grows at altitudes of 1,700–3,500 m (5,577–11,483 ft) in the Himalayas and neighbouring mountain ranges, from Nepal to southern China. At lower altitudes it is found as an evergreen in thickets and forest margins; at higher altitudes, it is deciduous and is usually found in pastures and grassy glades (Lancaster, 2009). It usually reaches a height of about 2.5 m (8 ft 2 in), though some specimens reach 4 m (13 ft) or more.

Daphne bholua has leathery leaves and deep pink flowers with a powerful fragrance(Lancaster,



2009), and a number of named cultivars have been bred and are grown as garden plants in Europe and North America.

Two subspecies recognized: nominate *Daphne bholua* subsp. *bholua* and are the D. bholua subsp. emeiensis Halda, which the *Flora* of China treats as а separate species, D. emeiensis. D. bholua subsp. emeiensis is distinguished from subsp. bholua by obtuse leaves, shorter oblong involucral bracts (up to 7 mm rather than 18 mm), and shorter calyx lobes (3-5 mm rather than 5-7 mm) (Wang et al. 2017; Halda, 1997). It has reddish fruit (Halda, 1997). It is found in forests and forest margins at altitudes of 800–1100 m in Mount Emei and Pingshan county in Sichuan, China.

3.4.2 Distribution

D. bholua has a wide range in the Himalayas and adjoining ranges, from Nepal through Bhutan, Bangladesh, Myanmar and Vietnam, into <u>Sichuan</u> and north-west Yunnan.In Nepal, the plant's common name is "baruwa"; in Tibet it is "chu chu" *(Manandhar et al. 2002)*.

3.4.3 Uses

D. bohlua is one of a number of species of *Daphne* that are used in traditional paper-making in Nepal (*Trier, 1972*), hence its common English name of "paper daphne" (*Buffin, 2005*). The inner bark also yields a fibre that is used to make rope. Although all parts of the plant are said to be poisonous (*Cooper et al., 1984*), the bark and roots are used in traditional medicine in Nepal to treat fevers (*Manandhar et al. 2002*).

3.4.4 Cultivation

Most cultivars of *Daphne bholua* will grow in alkaline or acidic soils, though shallow chalky soils and light sandy soils, which dry out in hot weather, are unsuitable: a steady supply of moisture is essential during the growing season. A position that is sheltered both from the full sun and from strong winds is preferred (*White, 2006*).

Because cultivated varieties of *D* bholua flower in winter, they tend not to produce much seed, and the seed has a short period of viability (*White, 2006*), so must be sown soon after collection, under gentle heat. Germination is usually complete within six to eight weeks. Plants sown from seed produce their first flowers after three or four years.



Most cultivars are very difficult to propagate from cutting, being slow to root and to establish (*Buffin, 2005*) *D. bholua f. alba* and *D. bohlua* 'Darjeeling' are reported to be the easiest cultivars to propagate from cuttings (*White, 2006*).

In view of the difficulties of growing from seed or cuttings, cultivars have traditionally been propagated by grafting cuttings onto the rootstock of a related species, usually D. *longilobata* or D. *mezereum*, which are more easily grown from seed. Even this is not reliable: plants that have grown well for eight to ten years may die suddenly when the root system collapses (*Buffin, 2005*).

In recent years, some cultivars have been multiplied by micropropagation. Micropropagated plants produce suckers, like the wild species, so that even if the main stem dies, the suckers ensure that the plant will continue to flourish (*Buffin, 2005*).

3.4.5 Suitable Habitat

During the study, we have identified 16.48 km² suitable habitats for Lokta in Manang district. This is 0.75% of total area of district (**Figure 5**).





Figure 5: Suitable habitat for Lokta

3.5Chiraito(Swertia chirayita)

3.5.1 Introduction

Chiraito [Botanical name: *Swertia chirayita* (Roxb. ex Fleming) Karsten; English- Chireeta; Family- Gentianaceae], also known as Tite/ Pothi Chiraito/ Tikta is a perennial herb of temperate regions of Nepal. Chiraito is one of the highest export revenue earning medicinal plants of Nepal. Apart from the collection from wild, it is now cultivated in most of the eastern districts of Nepal.

Chiraito is a biennial or perennial herb with seasonal growth. It mostly has a single stout elongated stem, size of which ranged from 60cm to 150cm with branching at tip. Colour of stem



is greenish brown at young and turns light brown to light violet as the plant attains maturity. Stem is cylindrical at base, quadrangular upwards. Roots are generally small, 5-10cm long, light brown, somewhat twisted and gradually tapering, bearing a few rootlets or their remnants. Leaves are ovate, elliptic or broadly lanceolate, sessile, opposite, acute, 3-5 nerved, 1.6-10cm by 0.3- 3cm. Leaves grown near base are often larger than that grown near tips. Flowers are greenish yellow borne in small clusters. Flowers contain numerous minute seeds. It is unable to exhibit thick stocking. Whole plant is intensely bitter in taste. Flowering takes place from July to October and fruiting from September to November (Polunin and Stainton 1984, Ghimire et al. 2008b, Pyakurel 2008, Pyakurel and Baniya 2011).

Chiraito is distributed within the altitude of 1500m to 3000m throughout Nepal. Plant prefers North and North West facing moist habitat on forests, rangelands and around cultivated lands. But it is found mostly on South West facing slopes of mixed broad leaved forest. Chiraito population mainly comprised of juveniles, followed by rosette stage and adults in wild (Pyakurel 2008). Major associates of Chiraito are Anaphalis sp, Desmodium sp, Anemone obtusiloba, Elsholtzia sp, Fragaria sp, Oxalis corniculata etc (Ghimire et al. 2008a, Pyakurel 2008).

3.5.2 Uses

Chiraito is one of the most important medicinal plants of the mid-hills has historical, ethnobotanical, medical as well as economic values for the local communities. Chiraito is an integral part of Ayurved, Yunani, Chinese and Tibetan medication system. It is also used in herbal medication system in USA and UK (Joshi and Dhawan, 2005). Whole plant is intensely bitter in taste. Chiraito is useful to treat more than 15 diseases, disorders & ailments locally and through Ayurvedic & Allopathic medicines. Dried plant is soaked in a glass of water (150-200ml) overnight and the extract is taken orally to treat fever, asthma, cold and cough. Crushed seeds are considered most effective to cure those ailments. Plant juice is taken with water to treat jaundice, headache, malarial fever, stomach disorder, gastric, ulcer and anthelmintic medicine. The plant is also used for the treatment of cuts and wounds (Ghimire et al. 2008a). Chiraito immersed in half glass of water overnight is taken twice a day to treat diabetes and 1 teaspoon decoction thrice a day is taken to treat fever in Nubri Valley, Gorkha (Pyakurel and Gurung 2006). Paste of plant is used to treat various skin diseases (Manandhar 2002). It is used as tonic, febrifuge, antidiarrhoetic and to cure various liver problems. The plant is used to control the sugar



level in blood. The plant shows antipyretic, sudorific, antiperiodic, anthelmintic, antiinflammatory and hepatoprotective actions and used in urinary and liver disorders (CSIR 1986).

More than 300 tons of cultivated and wild collected Chiraito is exported from Nepal to India and Tibet. A study by Pyakurel and Oli (2013) revealed that 232 tons of Chiraito was exported from eastern region of Nepal to India (152 tons) and Tibet (80 tons). Other countries such as Germany, Sweden, Italy, Holland, USA etc also import Chiraito but in the minimal quantity (Pyakurel and Baniya 2011). Panchase specific: Distribution of Chiraito is confined to Panchase core area and as per the Panchase Protected Forest Management Plan; it is illegal to collect any forest resources, including NTFPs from core area. However there has been reports of informal trade of Chiraito (e.g. as souvenir to the relatives). Likewise, the study team recorded/ visualized few bundles of Chiraito from restaurants in Panchase area. Most household has Chiraito as it has household usage. Detailed resource assessment is mandatory to assess the present stock of Chiraito in Panchase area. However, it can be estimated that about 700 kg of Chiraito is available in Panchase area. The stock can be increased by cultivating Chiraito in upper tropical and temperate zones of Sidane, Bhadaure, Tamagi, Chire and Arther.

3.5.3 Suitable Habitat

During the study, we have identified 25.06 km^2 suitable habitats for Chiraito in Manang district. This is 1.12 % of total area of district (**Figure 6**).





Figure 6: Suitable Habitat for Chiraito

3.6Distribution of vulnerable plants

Distribution maps of Guchhi Chyau(*Morchella esculenta*), Lauth Salla (*Taxus wallichinana*), Nirmansi(*Delphinium denudatum*), Okhar (*Juglans regia*), Sungandhawal (*Valeriana jatamansi*) were prepared. Most of these species are distributed in the southern part of the district (**Figure 7-11**).





Figure 7: Distribution map of Guchhi Chyau



Figure 8: Distribution map of Lauth Salla









Figure 10: Distribution map of Okhar





Figure 11: Distribution map of Sugandhawal



4. Conclusions and Recommendations

This study identified the distribution and suitable habitats for vulnerable plant species in Manang district of Nepal. The south eastern part of the district is more suitable for vulnerable species and NTFPs.The study identified 92.40, 16.85, 144.63, 6.32 and 25.06 km² of suitable habitat of Ban Lasun, Lokta, Panchaule, Satuwa and Chiraito respectively in Manang district of Nepal. The Manang district is providing more habitats for Panchaule than for other NTFPs.These suitable habitat patches should be conserved for long term and sustainable harvesting of the NTFPs.



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Appendix

Table: Data collected	l during the protected areas
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S.N				Altitud		
	Speceis	X	Y	e	Major Species	Major Species
		84.370	28.507			
1	Ban lasun	7	3	2990	laligurans	pepe, roro
		84.372	28.506			
2	Ban lasun	7	8	3033	laligurans	pepe, roro
		84.376	28.504			
3	Ban lasun	9	1	3082	simal, laligurans	lapa
		84.382	28.504			
4	Ban lasun	7	6	3071	khina	ruis
		84.384	28.507			
5	Ban lasun	9	8	3098	khina	lapa
		84.385	28.507			
6	Ban lasun	1	4	3108	khina	lapa
		84.385				
7	Ban lasun	2	28.507	3116	khina	lapa
		84.385				
8	Ban lasun	6	28.507	3125	khina	lapa
		84.385	28.506			
9	Ban lasun	6	8	3125	khina	lapa
		84.385	28.506			
10	Ban lasun	3	4	3126	ruis	salla
		84.384	28.506			
11	Ban lasun	6	7	3115	khina	khina
		84.383	28.506			
12	Ban lasun	4	2	3092	khina	khina
		84.383	28.506			
13	Ban lasun	5	1	3095	Khina	khina,
		84.383	28.506			
14	Ban lasun	7	9	3099	Khina	khina,
		84.384	28.507			
15	Ban lasun	9	7	3104	Khina	ruis
			28.507			
16	Ban lasun	84.385	7	3106	Khina	ruis
		84.385	28.507			
17	Ban lasun	1	7	3107	Khina	ruis
		84.385	28.507			
18	Ban lasun	1	5	3108	Khina	ruis
		84.385	28.507			
19	Ban lasun	1	2	3113	Khina	ruis



		84.385	28.506			
20	Ban lasun	4	8	3124	laligurans	khina, roro
		84.385	28.506			
21	Ban lasun	4	5	3128	laligurans	khina, roro
		84.385	28.506		_	
22	Ban lasun	3	5	3129	ruis	khina, roro
		84.385	28.506			
23	Ban lasun	2	4	3130	ruis	khina, roro
		84.385	28.506			
24	Ban lasun	1	3	3129	ruis	khina, roro
		84.384	28.506			
25	Ban lasun	9	3	3127	ruis	khina, roro
		84.384	28.506			
26	Ban lasun	6	3	3122	lokta	laligurans, pepe
		84.378	28.503			
27	Ban lasun	8	3	3108	Khina	laligurans, khasru
		84.378	28.503			
28	Ban lasun	5	3	3102	Khina	laligurans, khasru
		84.378	28.503			
29	Ban lasun	3	4	3106	Khina	laligurans, khasru
		84.366	28.512			
30	Chiraito	7	7	2372	lokta	bhalayo, katus
		84.367				•
31	Chiraito	1	28.513	2380	lokta	bhalayo, katus
		84.367	28.512			
32	Chiraito	4	9	2406	lokta	lokta, katus
		84.367	28.512			
33	Chiraito	5	6	2421	lokta	lokta, katus
			28.511			
34	Chiraito	84.369	9	2550	katus	laligurans, katus
		84.369				
35	Chiraito	2	28.511	2562	katus	lokta, laligurans
		84.369	28.511			
36	Chiraito	5	3	2623	nigaalo	lokta, katus
		84.370	28.508			
37	Chiraito	8	7	2830	thingre salla	ruis
		84.376	28.470		<u> </u>	
38	Chiraito	4	8	1725	Nigaalo	pepe, roro, khasru
		84.378	28.469		-	
39	Chiraito	8	8	1916	Ro Ro	Bilauni, pepe
		84.378	28.469			
40	Chiraito	9	8	1916	Ro Ro	Bilauni, pepe
		84.378	28.469			
41	Chiraito	9	8	1916	Ro Ro	Bilauni, pepe



42 Chiraito 9 28.47 1916 pe pe Churo, pepe 43 Chiraito 84.38 3 2035 pe pe Churto, pepe 44 Chiraito 1 5 2050 pe pe Churto, pepe 45 Chiraito 1 5 2062 lokta pepe, roro 46 Chiraito 84.381 28.470 28.470 pepe, roro 47 Chiraito 84.381 28.470 pepe, roro 28.470 47 Chiraito 84.381 28.470 pepe, roro 28.470 48 Chiraito 8 7 2174 Katus khasru 49 Chiraito 84.381 28.470 2175 lokta pepe, katus 50 Chiraito 9 7 2178 Katus Roro, khasru 51 Chiraito 84.381 28.47 2131 lokta pepe, roro 53 Chiraito 1 28.47			84.379				
43 Chiraito 84.38 28.470 pe pe Chutro, pepe 44 Chiraito 1 5 2050 pe pe Chutro, pepe 45 Chiraito 84.380 28.470 pepe, roro pepe, roro 45 Chiraito 84.381 28.470 pepe, roro pepe, roro 46 Chiraito 84.381 28.470 pepe, roro pepe, roro 47 Chiraito 84.381 28.470 pepe, roro pepe, roro 48 Chiraito 84.381 28.470 pepe, lokta Roro 49 Chiraito 8 7 2173 Roro pepe, lokta 50 Chiraito 9 7 2175 lokta pepe, katus 51 Chiraito 84.381 28.470 pepe pepe, katus 52 Chiraito 1 28.470 pepe pepe, roro 52 Chiraito 1 28.470 pepe pepe, roro	42	Chiraito	9	28.47	1916	pe pe	Chutro, pepe
43 Chiraito 84.38 3 2035 pe pe Chutro, pepe 44 Chiraito 1 5 2050 pe pe Chutro, pepe 45 Chiraito 4 5 2050 pe pe Chutro, pepe 46 Chiraito 4 5 2062 lokta pepe, roro 46 Chiraito 84.381 28.470 pepe, roro pepe, roro 47 Chiraito 9 9 2172 lokta Roro 48 Chiraito 84.381 28.470 pepe, lokta Roro 49 Chiraito 8 7 2173 Roro pepe, katus 50 Chiraito 8 7 2175 lokta pepe, roro 51 Chiraito 84.381 28.470 pepe, roro s4.381 pepe, roro 53 Chiraito 1 2.8.47 2113 lokta pepe, roro 54 Chiraito 1 2.8.47				28.470			
44 Chiraito 84.380 28.470 Pe pe Chutro, pepe 45 Chiraito 84.380 28.470 Pepe, roro Pepe, roro 46 Chiraito 84.381 28.470 Pepe, roro Pepe, roro 47 Chiraito 84.381 28.470 Pepe, roro Pepe, roro 47 Chiraito 84.381 28.470 Pepe, roro Pepe, roro 48 Chiraito 84.381 28.470 Pepe, roro Pepe, roro 48 Chiraito $8-7$ 2174 Katus khasru 49 Chiraito 8 7 2173 Roro Pepe, lokta 50 Chiraito 84.381 28.470 Partician Pepe, satus 51 Chiraito 84.381 28.470 Pepe, katus Pepe, roro 53 Chiraito 84.381 28.470 Partician Pepe, roro 53 Chiraito 84.381 28.477 Partician Pe	43	Chiraito	84.38	3	2035	pe pe	Chutro, pepe
44 Chiraito 1 5 2050 pe pe Chutro, pepe 45 Chiraito 4 5 2062 lokta pepe, roro 46 Chiraito 84.381 28.470 pepe, roro 28.470 47 Chiraito 84.381 28.470 pepe, roro 84.381 28.470 47 Chiraito 8 7 2174 Katus khasru 48 Chiraito 8 7 2173 Roro pepe, lokta 49 Chiraito 9 7 2175 lokta pepe, katus 50 Chiraito 9 7 2175 lokta pepe, roro 51 Chiraito 9 7 2178 Katus Roro, khasru 52 Chiraito 4 28.47 2133 lokta pepe, roro 53 Chiraito 1 28.47 214 Nigaalo pepe, roro 54 Chiraito 1 28.473 <td></td> <td></td> <td>84.380</td> <td>28.470</td> <td></td> <td></td> <td></td>			84.380	28.470			
45 Chiraito 4 5 2062 lokta pepe, roro 46 Chiraito 84.381 4 2090 lokta pepe, roro 46 Chiraito 84.381 28.470 pepe, roro Roro 47 Chiraito 9 9 2172 lokta Roro 48 Chiraito 8 7 2174 Katus khasru 49 Chiraito 8 7 2173 Roro pepe, lokta 50 Chiraito 8 7 2175 lokta pepe, katus 51 Chiraito 84.381 28.470 7 2178 Katus Roro, khasru 52 Chiraito 4 28.47 2133 lokta pepe, roro 53 Chiraito 1 28.47 2133 lokta pepe, roro 54 Chiraito 1 28.47 2133 lokta pepe	44	Chiraito	1	5	2050	pe pe	Chutro, pepe
45Chiraito452062loktapepe, roro46Chiraito 84.381 28.470 992172loktapepe, roro47Chiraito 9 92172loktaRoro48Chiraito 84.381 28.471 872174Katuskhasru48Chiraito 84.381 28.470 972173Roropepe, lokta49Chiraito 84.381 28.470 972175loktapepe, katus50Chiraito 9 72175loktapepe, katus51Chiraito 84.381 28.47028.470 2175Roropepe, roro52Chiraito 44 28.47 2133loktapepe, roro53Chiraito1 28.47 28.5372133loktapepe, roro54Chiraito1 28.47 28.537214Nigaalopepe55Chiraito222243pepekadus56Chiraito84.373 28.53728.536 62279bhoipatrakatus, bhotepipal58Chiraito772305ycda, pepegobresalla59Chiraito842282gobre sallaunieu, badihalto60Chiraito832268gobre sallakatus, pepe61Chiraito62255UniyoChutro, palla62Chiraito84.37432216			84.380	28.470			
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46 Chiraito 84.381 4 2090 lokta pepe, roro 47 Chiraito 9 9 2172 lokta Roro 48 Chiraito 84.381 28.470 Roro Roro 48 Chiraito 8 7 2174 Katus khasru 49 Chiraito 8 7 2173 Roro pepe, lokta 50 Chiraito 8 7 2175 lokta pepe, katus 51 Chiraito 84.381 28.470 pepe, katus Roro, khasru 52 Chiraito 84.381 28.470 pepe, roro Roro, khasru 53 Chiraito 4 28.47 2113 lokta pepe, roro 54 Chiraito 1 28.47 2114 Nigaalo pepe, roro 55 Chiraito 1 28.47 2114 Nigaalo pepe 55 Chiraito 2 2243 pepe <td< td=""><td></td><td></td><td></td><td>28.470</td><td></td><td></td><td></td></td<>				28.470			
47 Chiraito 9 9 2172 lokta Roro 48 Chiraito 84.381 28.470 Katus khasru 49 Chiraito 84.381 28.470 pepe, lokta 49 Chiraito 8 7 2173 Roro pepe, lokta 50 Chiraito 9 7 2175 lokta pcpc, katus 51 Chiraito 84.381 28.470 pcpc, katus Roro, khasru 52 Chiraito 84.381 28.470 pepe, roro Roro, khasru 53 Chiraito 84.381 28.477 2113 lokta pepe, roro 53 Chiraito 1 28.47 2114 Nigaalo pepe, roro 54 Chiraito 1 4 2247 unieu pepe 55 Chiraito 2 2233 pepe kadus 57 Chiraito 8 6 2279 bhoipatra ka	46	Chiraito	84.381	4	2090	lokta	pepe, roro
47 Chiraito 9 9 2172 lokta Roro 48 Chiraito 84.381 28.471 2174 Katus khasru 49 Chiraito 84.381 28.470 pepe, lokta pepe, lokta 50 Chiraito 9 7 2175 lokta pepe, katus 51 Chiraito 84.382 7 2178 Katus Roro, khasru 52 Chiraito 84.381 28.470 2133 lokta pepe, roro 53 Chiraito 44 28.47 2113 lokta pepe, roro 54 Chiraito 4 28.47 2114 Nigaalo pepe 54 Chiraito 1 4 2247 unieu pepe 55 Chiraito 2 2 2243 pepe kadus 56 Chiraito 8 6 2279 bhoipatra katus, bhotepipal 58 Chira			84.381	28.470			
48 Chiraito 84.381 28.471 Katus khasru 49 Chiraito 8 7 2173 Roro pepe, lokta 50 Chiraito 9 7 2173 Roro pepe, lokta 50 Chiraito 9 7 2175 lokta pcpc, katus 51 Chiraito 84.381 28.470 2178 Katus Roro, khasru 52 Chiraito 84.381 28.470 2133 lokta pepe, roro 53 Chiraito 4 28.47 2113 lokta pepe, roro 54 Chiraito 1 28.47 2114 Nigaalo pepe 54 Chiraito 1 4 2247 unieu pepe 55 Chiraito 2 2 2243 pepe kadus 56 Chiraito 8 6 2279 bhoipatra katus, bhotepipal 58 Chiraito 8 <td>47</td> <td>Chiraito</td> <td>9</td> <td>9</td> <td>2172</td> <td>lokta</td> <td>Roro</td>	47	Chiraito	9	9	2172	lokta	Roro
48 Chiraito 8 7 2174 Katus khasru 49 Chiraito 84.381 28.470 Roro pepe, lokta 50 Chiraito 9 7 2175 lokta pepe, katus 51 Chiraito 84.382 7 2175 lokta pepe, katus 51 Chiraito 84.382 7 2178 Katus Roro, khasru 52 Chiraito 84.381 28.470 pepe, roro Roro, khasru 53 Chiraito 1 28.47 2113 lokta pepe, roro 53 Chiraito 1 28.47 2114 Nigaalo pepe, roro 54 Chiraito 1 4 2247 unieu pepe 56 Chiraito 2 2.536 22.43 pepe kadus 57 Chiraito 8 6 2279 bhoipatra katus, bhotepipal 58 Chiraito 2 28.536			84.381	28.471			
49 Chiraito 84.381 28.470 Roro pepe, lokta 50 Chiraito 9 7 2173 Roro pepe, lokta 51 Chiraito 9 7 2175 lokta pepe, katus 51 Chiraito 84.381 28.470 2178 Katus Roro, khasru 52 Chiraito 4 28.477 2133 lokta pepe, roro 53 Chiraito 1 28.477 2114 Nigaalo pepe, roro 54 Chiraito 1 4 2247 unieu pepe 55 Chiraito 2 2 2243 pepe kadus 56 Chiraito 8 6 2279 bhoipatra katus, bhotepipal 57 Chiraito 8 6 2279 bhotepipal katus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 <	48	Chiraito	8	7	2174	Katus	khasru
49 Chiraito 8 7 2173 Roro pepe, lokta 50 Chiraito 9 7 2175 lokta pepe, katus 51 Chiraito 84.381 7 2175 lokta pepe, katus 52 Chiraito 84.382 7 2173 Katus Roro, khasru 52 Chiraito 4 28.47 2133 lokta pepe, roro 53 Chiraito 1 28.47 2114 Nigaalo pepe, roro 54 Chiraito 1 28.47 2114 Nigaalo pepe 55 Chiraito 1 4 2247 unieu pepe 55 Chiraito 2 2243 pepe kadus 56 Chiraito 8 6 2279 bhoipatra katus, bhotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 Chiraito 8 3			84.381	28.470			
50 Chiraito 9 7 2175 lokta pepe, katus 51 Chiraito 84.381 28.470 2178 Katus Roro, khasru 52 Chiraito 4 28.477 2133 lokta pepe, roro 53 Chiraito 1 28.477 2133 lokta pepe, roro 53 Chiraito 1 28.477 2114 Nigaalo pepe, roro 54 Chiraito 1 4 2247 unieu pepe 55 Chiraito 2 22437 pepe kadus 55 Chiraito 2 2243 pepe kadus 56 Chiraito 84.372 28.536 2279 bhojpatra katus, bhotepipal 57 Chiraito 84.371 28.535 2298 bhotepipal katus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 Chiraito 8 3 2268 gobre salla katus, pepe	49	Chiraito	8	7	2173	Roro	pepe, lokta
50 Chiraito 9 7 2175 lokta pepe, katus 51 Chiraito 84.382 7 2178 Katus Roro, khasru 52 Chiraito 4 28.47 2133 lokta pepe, roro 53 Chiraito 4 28.47 2114 Nigaalo pepe, roro 54 Chiraito 1 28.47 2114 Nigaalo pepe, roro 54 Chiraito 1 4 2247 unieu pepe 55 Chiraito 2 2 2243 pepe kadus 56 Chiraito 8 6 2279 bhojpatra katus, bhotepipal 57 Chiraito 8 6 2278 bhotepipal katus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 58 Chiraito 8 4 2282 gobre salla unieu, badihalto 59 Chirai			84.381	28.470			
51 Chiraito 84.382 7 2178 Katus Roro, khasru 52 Chiraito 4 28.47 2133 lokta pepe, roro 53 Chiraito 1 28.47 2133 lokta pepe, roro 53 Chiraito 1 28.47 2114 Nigaalo pepe, roro 54 Chiraito 1 4 2247 unieu pepe 54 Chiraito 1 4 2247 unieu pepe 55 Chiraito 2 2243 pepe kadus 56 Chiraito 8 6 2279 bhojpatra katus, bhotepipal 57 Chiraito 8 6 2279 bhotepipal katus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito	50	Chiraito	9	7	2175	lokta	pepe, katus
51Chiraito 84.382 7 2178 KatusRoro, khasru52Chiraito4 28.47 2133 loktapepe, roro53Chiraito1 28.47 2114 Nigaalopepe, roro53Chiraito1 28.539 pepe, roropepe, roro54Chiraito14 2247 unieupepe55Chiraito22 2243 pepekadus56Chiraito86 2279 bhojpatrakatus, bhotepipal56Chiraito22 28.536 28.536 28.537 57Chiraito2 28.536 2298 bhotepipalkatus, bjotepipal58Chiraito77 2305 yeda, pepegobresalla60Chiraito8 3 2268 gobre sallaunieu, badihalto61Chiraito6 6 2255 UniyoChutro, palla62Chiraito 84.374 3 2216 pepechutro, nigaalo				28.470			
52 Chiraito 4 28.47 2133 lokta pepe, roro 53 Chiraito 1 28.47 2114 Nigaalo pepe, roro 53 Chiraito 1 28.47 2114 Nigaalo pepe, roro 54 Chiraito 1 4 2247 unieu pepe 55 Chiraito 2 2 2243 pepe kadus 55 Chiraito 2 2 2243 pepe kadus 56 Chiraito 84.372 28.536 2279 bhojpatra katus, bhotepipal 57 Chiraito 8 6 2279 bhotepipal katus, bjotepipal 58 Chiraito 2 28.536 2298 bhotepipal katus, bjotepipal 59 Chiraito 7 7 2305 yeda, pepe gobresalla 60 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 6 6 2255 Uniyo	51	Chiraito	84.382	7	2178	Katus	Roro, khasru
52 Chiraito 4 28.47 2133 lokta pepe, roro 53 Chiraito 1 28.47 2114 Nigaalo pepe, roro 53 Chiraito 1 28.47 2114 Nigaalo pepe, roro 54 Chiraito 1 4 2247 unieu pepe 54 Chiraito 2 2 2243 pepe kadus 55 Chiraito 2 2 2243 pepe kadus 56 Chiraito 8 6 2279 bhojpatra katus, bhotepipal 57 Chiraito 2 28.536 2298 bhotepipal katus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 Chiraito 8 4 2282 gobre salla unieu, badihalto 60 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 6 6 2255 Uniyo Chutro, palla 62			84.381				
53 Chiraito 1 28.47 2114 Nigaalo pepe, roro 53 Chiraito 1 4 2247 unieu pepe 54 Chiraito 1 4 2247 unieu pepe 54 Chiraito 2 2243 pepe kadus 55 Chiraito 2 2243 pepe kadus 56 Chiraito 8 6 2279 bhojpatra katus, bhotepipal 57 Chiraito 8 6 2279 bhotepipal katus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 Chiraito 8 4 2282 gobre salla unieu, badihalto 60 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 6 6 2255 Uniyo Chutro, palla 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 62 Chiraito	52	Chiraito	4	28.47	2133	lokta	pepe, roro
53 Chiraito 1 28.47 2114 Nigaalo pepe, roro 54 Chiraito 1 4 2247 unieu pepe 55 Chiraito 2 2247 unieu pepe kadus 55 Chiraito 2 2243 pepe kadus 56 Chiraito 8 6 2279 bhojpatra katus, bhotepipal 57 Chiraito 8 6 2279 bhotepipal katus, bjotepipal 57 Chiraito 2 28.536 2298 bhotepipal katus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 Chiraito 8 4 2282 gobre salla unieu, badihalto 60 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 6 6 2255 Uniyo Chutro, palla 62			84.381				
54 Chiraito 84.375 28.539 14 2247 unieu pepe 55 Chiraito 2 2 2243 pepe kadus 55 Chiraito 2 2 2243 pepe kadus 56 Chiraito 8 6 2279 bhojpatra katus, bhotepipal 57 Chiraito 2 28.536 2298 bhotepipal katus, bjotepipal 57 Chiraito 2 28.536 2298 bhotepipal katus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 Chiraito 8 4 2282 gobre salla unieu, badihalto 60 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 8 3 2268 gobre salla katus, pepe 62 Chiraito 6 6 2255 Uniyo Chutro, n	53	Chiraito	1	28.47	2114	Nigaalo	pepe, roro
54 Chiraito 1 4 2247 unieu pepe 55 Chiraito 2 2 2243 pepe kadus 55 Chiraito 2 2 2243 pepe kadus 56 Chiraito 84.372 28.536 2279 bhojpatra katus, bhotepipal 56 Chiraito 84.372 28.536 2298 bhotepipal katus, bjotepipal 57 Chiraito 2 28.536 2298 bhotepipal katus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 Chiraito 84.370 28.536 2282 gobre salla unieu, badihalto 60 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 6 2255 Uniyo Chutro, palla 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 62 <			84.375	28.539			
55 Chiraito 84.373 28.537 22 2243 pepe kadus 56 Chiraito 8 6 2279 bhojpatra katus, bhotepipal 56 Chiraito 8 6 2279 bhojpatra katus, bhotepipal 57 Chiraito 2 28.536 2298 bhotepipal katus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 Chiraito 8 4 2282 gobre salla unieu, badihalto 60 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 6 6 2255 Uniyo Chutro, palla 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 62 Chiraito 84.370 28.536 2216 pepe chutro, nigaalo	54	Chiraito	1	4	2247	unieu	pepe
55Chiraito 2 2 2243 pepekadus 56 Chiraito 84.372 28.536 2279 bhojpatrakatus, bhotepipal 56 Chiraito 84.372 28.536 2298 bhotepipalkatus, bjotepipal 57 Chiraito 2 28.536 2298 bhotepipalkatus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepegobresalla 59 Chiraito 84.370 28.535 2288 gobre sallaunieu, badihalto 60 Chiraito 84.370 28.536 2268 gobre sallakatus, pepe 61 Chiraito 84.375 28.539 2268 gobre sallakatus, pepe 61 Chiraito 6 6 2255 UniyoChutro, palla 62 Chiraito 84.374 3 2216 pepechutro, nigaalo 63 84.370 28.536 84.370 28.536 44.370 44.376 64 6 6 2255 UniyoChutro, palla 63 84.374 3 2216 pepechutro, nigaalo 64 84.370 28.536 44.370 28.536 44.370 64 84.370 28.536 44.370 44.370 44.370 64 84.370 28.536 44.370 44.370 44.370 64 84.370 28.536 44.370 44.370 44.370 64 84.370 28.536 </td <td></td> <td></td> <td>84.373</td> <td>28.537</td> <td></td> <td></td> <td></td>			84.373	28.537			
56Chiraito 84.372 28.536 6 2279 bhojpatrakatus, bhotepipal57Chiraito2 28.536 2298 bhotepipalkatus, bjotepipal57Chiraito2 28.536 2298 bhotepipalkatus, bjotepipal58Chiraito77 2305 yeda, pepegobresalla59Chiraito84.370 28.535 gobre sallaunieu, badihalto60Chiraito83 2268 gobre sallakatus, pepe61Chiraito66 2255 UniyoChutro, palla62Chiraito 84.374 3 2216 pepechutro, nigaalo63 84.370 28.536 28.536 2216 pepe 28.536	55	Chiraito	2	2	2243	pepe	kadus
56Chiraito 8 6 2279 bhojpatrakatus, bhotepipal 57 Chiraito 2 28.536 2298 bhotepipalkatus, bjotepipal 57 Chiraito 2 28.536 2298 bhotepipalkatus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepegobresalla 59 Chiraito 84.370 28.535 gobre sallaunieu, badihalto 60 Chiraito 8 4 2282 gobre sallakatus, pepe 60 Chiraito 8 3 2268 gobre sallakatus, pepe 61 Chiraito 6 6 2255 UniyoChutro, palla 62 Chiraito 84.374 3 2216 pepechutro, nigaalo 62 Chiraito 84.374 3 2216 pepechutro, nigaalo			84.372	28.536			
57 Chiraito 84.372 28.536 2298 bhotepipal katus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 Chiraito 84.370 28.535 2282 gobre salla unieu, badihalto 60 Chiraito 8 4 2282 gobre salla katus, pepe 60 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 6 6 2255 Uniyo Chutro, palla 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo	56	Chiraito	8	6	2279	bhojpatra	katus, bhotepipal
57 Chiraito 2 28.536 2298 bhotepipal katus, bjotepipal 58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 Chiraito 84.370 28.535 2282 gobre salla unieu, badihalto 59 Chiraito 84.370 28.536 2268 gobre salla unieu, badihalto 60 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 6 6 2255 Uniyo Chutro, palla 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 62 Chiraito 84.370 28.536 4 4 4 4 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo			84.372			51	
58 Chiraito 84.371 28.535 yeda, pepe gobresalla 59 Chiraito 84.370 28.535 gobre salla unieu, badihalto 60 Chiraito 8 4 2282 gobre salla unieu, badihalto 60 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 6 6 2255 Uniyo Chutro, palla 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo	57	Chiraito	2	28.536	2298	bhotepipal	katus, bjotepipal
58 Chiraito 7 7 2305 yeda, pepe gobresalla 59 Chiraito 84.370 28.535 gobre salla unieu, badihalto 59 Chiraito 84.370 28.536 gobre salla unieu, badihalto 60 Chiraito 84.370 28.536 gobre salla katus, pepe 61 Chiraito 84.375 28.539 churo, palla churo, palla 62 Chiraito 84.374 3 2216 pepe churo, nigaalo 62 Chiraito 84.370 28.536 churo, nigaalo churo, nigaalo			84.371	28.535			
59 Chiraito 84.370 28.535 gobre salla unieu, badihalto 60 Chiraito 84.370 28.536 gobre salla unieu, badihalto 60 Chiraito 84.370 28.536 gobre salla katus, pepe 61 Chiraito 6 6 2255 Uniyo Chutro, palla 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 62 Chiraito 84.370 28.538 chutro, nigaalo chutro, nigaalo	58	Chiraito	7	7	2305	yeda, pepe	gobresalla
59 Chiraito 8 4 2282 gobre salla unieu, badihalto 60 Chiraito 84.370 28.536 sector sector sector 60 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 6 6 2255 Uniyo Chutro, palla 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 62 Chiraito 84.370 28.536 sector sector sector 63 Chiraito 84.374 3 sector sector sector sector			84.370	28.535			
60 Chiraito 84.370 28.536 gobre salla katus, pepe 61 Chiraito 6 6 2255 Uniyo Chutro, palla 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo	59	Chiraito	8	4	2282	gobre salla	unieu, badihalto
60 Chiraito 8 3 2268 gobre salla katus, pepe 61 Chiraito 6 6 2255 Uniyo Chutro, palla 61 Chiraito 6 6 2255 Uniyo Chutro, palla 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 61 84.370 28.536 6 6 2255 0	-		84.370	28.536	_	~	,
61 Chiraito 84.375 28.539 Churo, palla 61 Chiraito 6 6 2255 Uniyo Chutro, palla 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 62 Chiraito 84.370 28.536 chutro, nigaalo chutro, nigaalo	60	Chiraito	8	3	2268	gobre salla	katus, pepe
61 Chiraito 6 6 2255 Uniyo Chutro, palla 62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 62 84.370 28.536 5 5 5 5			84.375	28.539		<u> </u>	×1 1
62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 84.370 28.536 28.536 210 21	61	Chiraito	6	6	2255	Univo	Chutro, palla
62 Chiraito 84.374 3 2216 pepe chutro, nigaalo 62 84.370 28.536 5 </td <td></td> <td></td> <td></td> <td>28.538</td> <td></td> <td></td> <td>) <u>1</u></td>				28.538) <u>1</u>
84.370 28.536 Figure 1	62	Chiraito	84.374	3	2216	pepe	chutro. nigaalo
			84.370	28.536			, 8
63 Chiraito 1 7 2243 lokta paala. lokta	63	Chiraito	1	7	2243	lokta	paala, lokta



		84.369	28.536			
64	Chiraito	9	3	2245	salla	paala, lokta
		84.361	28.512			
65	chiraito	4	8	2195	pepe	lokta, chutro
		84.361	28.511			
66	chiraito	2	3	2228	nigaalo	lokta, chutro
		84.362	28.510			
67	chiraito	2	4	2219	nigaalo	lokta, chutro
			28.510			
68	chiraito	84.362	2	2232	nigaalo	lokta, chutro
		84.361	28.508			
69	Chiraito	9	3	2161	nigaalo	lokta, chutro
		84.408	28.560			pepe, lokta, bisadi,
70	Chiraito	9	4	2402	pepe	laligurans
		84.397	28.560			pepe, lokta, bisadi,
71	Chiraito	8	7	2442	laligurans	laligurans
		84.396	28.560			pepe, lokta, bisadi,
72	Chiraito	7	2	2402	bisaadi	laligurans
73	Chiraito	84.384	28.566	2243	pepe	bisaadi, lokta
		84.394	28.555			
74	Chiraito	3	9	2391	pepe	bisaadi, lokta
		84.407	28.572			
75	Chiraito	6	4	2572	lokta	bisadi, laligurans
	Gucchi	84.373	28.537			
76	mushroom	1	1	2254	lokta	pepe
	Gucchi	84.367	28.533			
77	mushroom	4	1	2213	salla	chutro
	Gucchi	84.366	28.532			
78	mushroom	9	8	2206	salla	salla
	Gucchi		28.525			
79	mushroom	84.363	3	2290		nigaalo
	Gucchi	84.359	28.524			
80	mushroom	8	2	2262	salla	salla, nigaalo
	Gucchi	84.359	28.523			
81	mushroom	8	6	2235	salla	salla, nigaalo
	Guchhi	84.370	28.508			
82	mushroom	9	2	2869	thingre salla	nigaalo
	Guchhi	84.380	28.502			
83	mushroom	7	3	3098	salla	ruis
	Guchhi	84.380	28.503	2055	11	
84	mushroom	6	3	3057	salla	ruis
0.5	Guchhi	84.385	28.506	2120		11
85	mushroom	4	6	3128	ruis	salla
07	Guchhi	84.373	28.537	22.42		1 1-
86	Mushroom	2	3	2243	pepe	kadus



	Guchhi	84.372	28.536			
87	Mushroom	3	1	2299	bhotepipal	lokta, pepe
	Guchhi	84.408			• •	pepe, lokta, bisadi,
88	mushroom	4	28.57	2508	katus	laligurans
	Guchhi	84.400	28.561			
89	mushroom	5	6	2482	okhar	khasru, mela
	Guchhi	84.396	28.560			
90	mushroom	7	2	2402	lokta	lokta, katus
	Guchhi	84.410	28.572			lokta, bisadi, gobre
91	mushroom	7	1	2566	pepe	salla
		84.376	28.470			
92	Kurilo	4	8	1728	Nigaalo	pepe, roro, khasru
		84.376	28.471			
93	Kurilo	8	2	1748	Nigaalo	pepe, roro, khasru
		84.377	28.470			
94	Kurilo	6	8	1747	Nigaalo	Bilauni, roro
		84.377	28.470			
95	Kurilo	9	8	1742	Nigaalo	Bilauni, pepe
		84.378	28.469			
96	Kurilo	8	8	1916	Ro Ro	Bilauni, pepe
		84.381	28.470			
97	Kurilo	3	9	2135	Roro	pepe, ghuyeli
		84.381	28.471			
98	Kurilo	6	4	2143	lokta	Roro
		84.381				
99	Kurilo	8	28.471	2168	lokta	khasru, roro
		84.381	28.470			
100	Kurilo	8	5	2163	Katus	Roro, khasru
		84.381	28.470			
101	Kurilo	7	3	2157	Katus	Roro, khasru
		84.371	28.536			
102	Kurilo	8	8	2270	pepe	lokta
		84.372	28.537			
103	Kurilo	7	1	2250	uniyo	nıgaalo
104	Kurilo	84.37	28.535	2238	Uniyo	nigaalo
			28.531			
105	Kurilo	84.366	8	2180	iun	nigaalo
		84.460	28.522			
106	Kutki	9	4	0		
		84.466	28.516	-		
107	Kutki	7	8	0		
		84.367	28.512	. –		
108	Loth salla	8	3	2447	lokta	lokta, katus
			28.512			
109	Loth salla	84.368	3	2468	nigaalo	jhar



		84.370	28.507			
110	Loth salla	2	5	2955	laligurans	pepe, roro
		84.376	28.512			
111	Loth salla	9	3	3100	laligurans	lapa
		84.408	28.569			pepe, lokta, bisadi,
112	Loth salla	2	6	2514	pepe, thingre salla	laligurans
		84.393				pepe, lokta, bisadi,
113	Loth salla	8	28.556	2387	thingre salla	laligurans
	Loth salla	84.410				
114	(249)	2	28.573	2575	Thingre salla	bisadi, laligurans
		84.384	28.506			
115	Nirmansi	7	7	0		
		84.375	28.505			
116	Nirmasi	1	9	3054	simal, laligurans	pepe, roro
		84.376	28.504			
117	Nirmasi	8	3	3077	simal, laligurans	pepe, roro
		84.382	28.504			
118	Nirmasi	6	5	3069	khina	ruis
		84.383				
119	Nirmasi	4	28.506	3093	khina	ruis
		84.384	28.506			
120	Nirmasi	6	4	3115	ruis	khina
		84.384	28.506			
121	Nirmasi	5	5	3113	ruis	khina
		84.376	28.503			
122	Nirmasi	8	7	3078		
		85.399	28.518			
123	Nirmasi	7	9	3097	laligurans	pe pe, ro ro
		84.384	28.507			
124	Nirmasi	6	7	3107	Khina	khina,
		84.384	28.507			
125	Nirmasi	7	8	3105	Khina	ruis
		84.384	28.507			
126	Nirmasi	9	7	3104	Khina	ruis
		84.385	28.507			
127	Nirmasi	1	1	3116	Khina	ruis
		84.385	28.506			
128	Nirmasi	4	9	3122	ruis	khina
		84.385	28.506			
129	Nirmasi	4	7	3127	laligurans	khina, roro
		84.384	28.506			
130	Nirmasi	9	3	3127	Khina	laligurans, pepe
		84.384	28.506			
131	Nirmasi	4	4	3118	lokta	laligurans, pepe



		84.383				
132	Nirmasi	3	28.5	3098	Khina	ro ro, pe pe
		84.379	28.503			
133	Nirmasi	1	3	3113	Khina	ro ro, pe pe
			28.503			
134	Nirmasi	84.379	4	3107	Khina	laligurans, khasru
		84.365	28.512			
135	Okhar	7	4	2251	Tuni	katus, pepe
		84.365	28.512			
136	Okhar	9	1	2260	laligurans	katus, pepe
		84.367	28.513			
137	Okhar	5	1	2395	lokta	lokta, katus
			28.512			
138	Okhar	84.369	4	2528	nigaalo	laligurans, katus
		84.365	28.512			
139	Okhar	6	6	2260	katus	katus
			28.537			
140	Okhar	84.373	6	2223	gobre salla	katus, pepe
		84.372	28.536			
141	Okhar	8	4	2293	bhotepipal	katus, pepe
		84.371	28.535			
142	Okhar	6	7	2305	yeda, pipal	gobresalla
		84.371	28.535			
143	Okhar	6	7	2302	yeda, pipal	gobresalla
		84.369	28.535			
144	Okhar	7	9	2243	рере	katus, salla
		84.362	28.524			
145	Okhar	5	4	2340	Tisya	ban katus
		84.407	28.566			pepe, lokta, bisadi,
146	okhar	4	8	2513	bhotepipal	laligurans
		84.406	28.565			
147	Okhar	5	7	2521	khasru	pepe, katus
		84.408	28.565			
148	Okhar	5	5	2532	katus	pepe, katus
		84.400	28.561			
149	Okhar	7	9	2475	mela	mela
		84.400	28.561			
150	Okhar	5	9	2477	lokta	mela
		84.400	28.561			
151	Okhar	5	7	2478	katus	khasru, mela
		84.399	28.560			
152	Okhar	4	8	2479	mela	kasru
		84.398	28.560			
153	Okhar	7	7	2479	thingre salla	lokta, katus



		84.397	28.560			
154	Okhar	7	6	2431	katus	lokta, katus
		84.383				
155	Okhar	2	28.56	2776	churetro	katus
		84.394	28.556			
156	Okhar	8	4	2387	pepe	bisaadi, lokta
		84.408	28.568			pepe, lokta, bisadi,
157	okhar	1	4	2510	laligurans	laligurans
		84.410	28.571			pepe, lokta, bisadi,
158	Okhar	7	8	2562	bhotepipal	laligurans
		84.366	28.511			
159	Paakhanved	2	9	2274	nigaalo	jhar
		84.366	28.511			
160	Paakhanved	7	8	2284	chutro	jhar
		84.366	28.512			
161	Paakhanved	8	2	2352	chutro	jhar
		84.368	28.512			
162	Paakhanved	3	2	2498	nigaalo	laligurans, katus
		84.369	28.511			¥:
163	Paakhanved	5	6	2584	nigaalo	lokta, jhar,
		84.369				
164	Paakhanved	7	28.511	2632	nigaalo	jhar
		84.365	28.512			
165	Paakhanved	7	7	2255		nigaalo
		84.380	28.502			
166	Paakhanved	8	3	3090	laligurans	khina,
		84.376	28.470			
167	Paakhanved	2	8	1731	Nigaalo	
		84.376	28.470			
168	Paakhanved	4	8	1748	Nigaalo	
		84.372	28.536			
169	paakhanved	9	7	2271	lokta	kadus
	1	84.372	28.536			
170	paakhanved	5	2	2296	bhotepipal	lokta, pepe
	-	84.374	28.538		•••	
171	Pakhanved	8	6	2236	Lahara	nigaalo
		84.371	28.536			
172	Pakhanved	5	9	2240	inaar	salla
		84.361	28.526			
173	Pakhanved	8	5	2246	inaar	nigaalo
			28.507			
174	Panch aule	84.384	3	3096	khina	ruis
		84.384	28.507			
175	Panch aule	8	5	3104	khina	ruis



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177 Panchaule 6 8 0 178 Panchaule 2 8 0 178 Panchaule 2 8 0 179 Panchaule 5 6 0 180 Panchaule 5 28.651 1	
178 Panchaule 2 28.579 0 178 Panchaule 2 8 0 179 Panchaule 5 6 0 180 Panchaule 5 28.651 0	
178 Panchaule 2 8 0 179 Panchaule 5 6 0 180 Panchaule 5 28.651 1	
179 Panchaule 84.477 28.510 0 180 Panchaule 5 6 0	
179 Panchaule 5 6 0 180 Panchaule 5 2 0	
180 Panchaule 5 2 0	
180 Panchaule 5 2 0	
84.474 28.662	
181 Panchaule 1 9 0	
84.468 28.658	
182 Panchaule 6 5 0	
84.474 28.663	
183 Panchaule 3 4 0	
84.366 28.511	
184 Satuwa 9 7 2285 lokta roro, katus	
84.369 28.511	
185 Satuwa 3 8 2570 lokta jhar	
84.370 28.510	
186Satuwa372649nigaalogurans	
84.370 28.510	
187 Satuwa 8 1 2665 nigaalo gurans	
84.383 28.506	
188 Satuwa 3 2 3088 khina khina	
84.377 28.503	
189 Satuwa 9 9 3089 khina khina	
84.377 28.504	
190Satuwa223080loktakhina	
84.378	
191 Satuwa 7 28.503 3118 laligurans khina,	
84.379 28.503	
192 Satuwa 3 3 3106 laligurans khina,	
84.385	
193Satuwa228.5073118laliguransruis	
84.385	
194 Satuwa 2 28.507 3120 laligurans khina	
84.385	
195 Satuwa 3 28.507 3121 ruis khina	
84.385 28.506	
196 Satuwa 5 9 3123 ruis khina	
84.385 28.506	
197Satuwa463128laliguranskhina. roro	



		84.383	28.506			
198	Satuwa	7	4	3105	lokta	laligurans, pepe
		84.383	28.505			
199	Satuwa	3	9	3100	Khina	laligurans, pepe
		84.381	28.502			
200	Satuwa	7	2	3085	Khina	ro ro, pe pe
		84.379	28.503			
201	Satuwa	1	4	3110	Khina	ro ro, pe pe
		84.380	28.470			
202	Satuwa	5	6	2061	lokta	pepe, roro
			28.470			
203	Satuwa	84.381	5	2093	lokta	pepe, roro
		84.381				
204	Satuwa	2	28.471	2131	lokta	pepe, roro
		84.382	28.471			
205	Satuwa	5	1	2135	lokta	pepe, roro
		84.381	28.478			
206	Satuwa	7	3	2143	lokta	pepe, roro
		84.382	28.471			
207	Satuwa	1	3	2149	Lokta	pepe, roro, khasru
		84.382	28.471			F -
208	Satuwa	2	1	2159	Lokta	pepe, roro, khasru
			28.470			F -
209	Satuwa	84.382	8	2166	Lokta	pepe, katus, khasru
		84.381	28.470			
210	Satuwa	9	7	2181	Lokta	pepe, katus, khasru
		84.381	28.470			
211	Satuwa	9	5	2178	Lokta	pepe, katus, khasru
		84.381	28.470			
212	Satuwa	8	1	2178	Lokta	roro, khasru
		84.381	28.469			
213	Satuwa	3	9	2134	Lokta	roro, khasru
		84.380	28.469			
214	Satuwa	9	7	2108	Lokta	roro, khasru
		84.380	28.469			
215	Satuwa	5	5	2075	Lokta	roro, khasru
		84,380	28.470			
216	Satuwa	9	5	2108	Roro	pepe, ghuveli
		84.381	28.470			<u> </u>
217	Satuwa	3	7	2136	Roro	pepe, ghuveli
		84.381	28.471	2100		r-r-, one on
218	Satuwa	4	20.1,1	2141	lokta	nepe, ghuveli
		84,381	28.471			r -r -, onaj -n
219	Satuwa	7	5	2149	lokta	Roro, khasru
	~	,	5			



		84.381	28.471			
220	Satuwa	8	4	2154	lokta	Roro, khasru
		84.381	28.471			
221	Satuwa	7	2	2160	Roro	khasru
		84.381	28.471			
222	Satuwa	7	1	2163	Katus	khasru, roro
		84.381				
223	Satuwa	7	28.471	2166	Katus	khasru, roro
			28.470			
224	Satuwa	84.382	7	2182	lokta	Roro, khasru
		84.381	28.470			
225	Satuwa	9	5	2165	Katus	Roro, khasru
		84.381	28.470			
226	Satuwa	7	5	2161	Katus	Roro, khasru
		84.381	28.470			
227	Satuwa	7	2	2156	pepe	Roro, khasru
-		84.381	28.470			
228	Satuwa	8	1	2159	pepe	Roro, khasru
			28.470			
229	Satuwa	84.382	1	2160	nene	Roro, khasru
	Satura	84 381	28 478	2100		
230	Satuwa	4	20.170	2148	nene	Roro khasru
200	Satura	84 381		2110		
231	Satuwa	6	28 47	2145	lokta	Roro khasru
201	Satura	84 381	20.17	2110		
232	Satuwa	3	28 47	2126	lokta	nene roro
232	Sutuvu	84 380	28.470	2120	TORT	
233	Satuwa	6	20.470	2095	Nigaalo	nene roro
233	Sutuvu	84 373	1	2075	1 (1guulo	
234	Satuwa	5	28 537	2262	lokta	kadus
234	Satuwa	5	28.536	2202	loktu	Kuuus
235	Satuwa	84 373	20.550	2271	lokta	nene
	Suturna	84 372	28 536			
236	Satuwa	8 8	20.550	2234	nene	unieu badibalto
230	Suturvu	84 372	28 536	<i>223</i> 7		
237	Satuwa	Q	20.550	2300	lokta	unieu badibalto
231	Saturra	84 371	78 536	2300		
238	Satuwa	от. <i>3</i> /1 0	20.550	2271	lokta	nene
230	Satuwa	84 371	28 536			- Popo
230	Satuwa	Q.	20.330 Q	2271	lokta	katus nene
257	Satuwa	8/ 371	28 526			Katuo, pope
240	Satuwa	7	20.330	2260	lokta	katus nene
240	Jaiuwa	/ 8/ 271	18 526	2209	ισκια	Kaius, pepe
2/1	Sature	04.3/1 5	20.330 0	2267	lokta	latua nono
241	Satuwa	3	ð	2207	ιοκια	katus, pepe



		84.367	28.533			
242	Satuwa	9	4	2220	lokta	lokta
		84.359	28.522			
243	Satuwa	6	5	2182	lokta	lokta
		84.359	28.521			
244	Satuwa	9	9	2189	lokta	bisaadi, lokta
		84.360	28.521			,
245	Satuwa	1	9	2190	salla	pepe, khasru
		84.407				pepe, lokta, bisadi.
246	Satuwa	9	28.569	2509	lokta	laligurans
	2	84 407	28 568			nene lokta bisadi
247	Satuwa	9	20.000	2509	nene	laligurans
	Saturia	84 407	28 566	2009	p•p•	langarans
248	Satuwa	4	20.000	2517	lokta	nene khasru katus
210	Suturia	84 406	28 566	2017	TORCU	
249	Satuwa	8	20.000	2524	lokta	nene khasru katus
247	Satuwa	0	28 564	2324	loktu	
250	Satuwa	84 405	20.504	2535	katus	nene katus
230	Batuwa	8/ 101	28 564	2555	Katus	
251	Satuwa	7	20.304	2528	katus	nene katus
231	Satuwa	84 402	28 563	2520	Katus	pepe, katus
252	Satuwa	04.402	20.505	2510		roro papa gurang
232	Satuwa	84 402	28 562	2319		Toro, pepe, gurans
252	Sotuvo	04.402 5	28.303	2516		roro popo gurong
233	Satuwa	94 402	28 562	2310		lolto, pepe, guians
254	Sotuvo	04.402	28.303	2510		iokia, bisaui, gobie
234	Satuwa	2	29 561	2310		Salla
255	Saturva	04.400	20.301	2477	Izatua	Ichagmi mala
233	Satuwa	<u> </u>	29 561	2477	Katus	Kilasiu, illela
256	Satura	04.392	28.301	1770	abunatra	Instag
230	Satuwa	0	29 560	1//2	chuleuo	Katus
257	Satura	84 202	28.300	1774	aburatra	Itotua
237	Satuwa	0 1 .393	70 555	1//4	Churcho	Katus
250	Sature	04.394	20.333	2200	latus	bisandi lakta
238	Satuwa	1 04 410	9	2389		olsaadi, lokta
250	Catarra	84.410	20 574	2556	I ningre salla, bisadi,	
239	Satuwa	1	28.374	2330	onotepipai	
260	Satura	01 11	28.3/3	756A		high
200	Satuwa	04.41	J 20 571	2304	gurans, omgre, sana	
261	Satura	04.410 	28.3/1	7551	Instag	pepe, lokia, bisadi,
201	Satuwa	3	0	2004	katus	langurans
200	0:14	84.368	28.533	2226	11 .	-1
262	Sil timur	6	8	2226	saila	cnutro,
0.00	C ¹¹ .	84.363	28.527	0005	11	1
263	Sil timur	1	5	2225	salla	chutro



	Sugandhawa	84.370	28.510			
264	1	8	3	2694	nigaalo	lokta
	Sugandhawa	84.370	28.510			
265	1	9	2	2703	nigaalo	lokta
	Sugandhawa	84.370	28.510			
266	1	1	2	2714	nigaalo	lokta
	Sugandhawa	84.370	28.509			
267	1	8	6	2786	nigaalo	salla
	Sugandhawa		28.509			
268	1	84.371	2	2810	nigaalo	salla
	Sugandhawa		28.507			
269	1	84.371	5	2926	nigaalo	lokta
	Sugandhawa	84.372	28.536			
270	1	1	8	2262	uniyo	bisaadi
	Sugandhawa	84.362	28.526			
271	1	6	4	2262		nigaalo
	Sugandhawa	84.403	28.564	-		pepe, lokta, bisadi.
272	1	4	6	2516	pepe	laligurans
	Sugandhawa	84.403	28.563			8
273	1	5	9	2514	katus	pepe, katus
	Sugandhawa	84.403	28.563			T - T - Y
274	1	5	8	2511		pepe, katus
	Sugandhawa	84.398	28.560	-		
275	1	7	7	2479	thingre salla	lokta, katus
	Sugandhawa	84.410	28.572		0	,
276	1	3	9	2573	gobre salla	bisadi, laligurans
	Sughandawa	84.372	28.536		8	lokta, bhotepipal.
277	1	7	5	2286	pepe	bhoipatra
	Sughandawa	84.372	28.536			JF
278	1	8	4	2294	bhotepipal	katus, pepe
	Sughandawa	84.369	28.534			
279	1	3	6	2248	unieu	roro, katus
	-	84 372	28 536			lokta bhoteninal
280	Timur	0 1.3 / <u>2</u> 7	20.000	2285	nene	bhoipatra
		84 372	28 536			
281	Timur	01.372 7	20.000	2289	nene	lokta bhoinatra
201	Tillui	84 372	28 536	2209		iona, onojpana
282	Timur	4	20.550	2298	vhoteninal	lokta, pepe
	1 1111/01	84 389	28 566	2270	, notopipui	nene lokta bisadi
283	Timur	5	20.000	2558	bisaadi	laliourans
	1 111141	84 393	28 555	200		nene lokta hisadi
284	Timur	Q	Q	2390	churetro	laliourans
207	1 111141	84 393	28 555	2370		
285	Timur	8 8	20.555	2388	churetro	bisaadi khasru
205	1 111141	0	/	2500	enuieuo	orsaadi, Kilasi u



		84.393	28.555			
286	Timur	4	6	2382	chretro	bisaadi, khasru

