REPORT 5

Strategies for improved fodder production in the dry season in the mid-hills of Nepal, using participatory research techniques.
Project code: R6994 A0721

Fourth joint fieldwork to address questions raised by initial data analyses, crosscheck bimonthly survey findings, discuss species performance with farmers and follow-up the new on-farm trial plots. 13th September to 10th October 1999.

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We would also like to express our sincere thanks to all the households who are have been involved in the bimonthly surveys and who now are undertaking on-farm trials (full identification of the 50 households within Appendix 1). Without their interest, dedication and knowledge our work would not be possible.

LIST OF ABBREVIATIONS

BE	British Embassy
CBO	Community Based Organisation
DfID	Department for International Development
DFRS	Department for Forest Research and Survey
FUG	Forest User Group
HMGN	His Majesty's Government of Nepal
LPP	Livestock Production Programme
NAF	Nepal Agroforestry Foundation
NGO	Non-government organisation
NRI	Natural Resources Institute
PAC	Pakhribas Agricultural Centre
RNRKS	Renewable Natural Resources Research Strategy
SEADD	South East Asia Development Division
TOT	Training of trainers
VDC	Village Development Committee
WN	World Neighbours

GLOSSARY OF NEPALI TERMS

Nepali	Definition
Badahar	*Artocarpus lakoocha*
Bari	Rainfed land that receives no additional water.
Bhari	One back-load of material (weight varies depending on material, who's carrying it, location and time of the year).
Bhatmase	*Flemengia congesta*
Dabdabe	*Garuga pinnata*
Dinanath	*Pennisetum pedicillatum*
Gedulo	*Ficus clavata*
Gharbari	Land close to the household
Gogan	*Saurauia napaulensis*
Guazuma	*Guazuma ulmifolia*
Ipil	*Leucaena* spp.
Kamuna	*Streblus asper*
Kangiyo	*Grevillea robusta*
Khanyu	*Ficus semicordata var. semicordata*
Kharbari	Rainfed land unsuited to crop growing that is used to grow thatching grass.
Khasreto	*Ficus hispida*
Khet	Land that is bunded and receives some additional water during the dry season. Supports two, or three crops per year
Khoriya	Land under shifting, or non-permanent cultivation (status of some kharbari land)
Kimbu	*Morus alba*
Koiralo	*Bauhinia variegata*
Kusauro	legume residues
Kutmiro	*Litsea monopetala*
Mana	0.5 litres
Molasses	*Melinus minuutiflora*
Nal	millet straw
Pakho bari	Sloping, rainfed land
Ropani	0.05 (one twentieth) of a hectare
Stylo	*Stylosanthes guianensis*
Tanki	*Bauhinia purpurea*
Timila	*Ficus auriculata*

Urmila Magar, farmer leader beside her trial plot, showing good growth of Molasses (*Melinis minutiflora*), and Kimbu (*Morus alba*) seedling in the foreground.

Collectors transporting milk from the new collection point at Tawari to Khobasi. Bicarbonate of soda is added to prevent curdling of the milk.

Sushmita Parajuli, farmer leader in Chankubesi, beside her trial plot. NB21 (*Pennisetum purpureum x Pennisetum americanum*) shows good establishment and growth in two months.

Thulo Toya Magar, farmer leader in Gauthale, beside Dhan Bdr Magar's trial plot showing excellent growth of Guazuma (*Guazuma ulmifolia*), Kimbu (*Morus alba*), Molasses (*Melinis minutiflora*), Ipil (*Leucaena diversifolia*) and NB21 (*Pennisetum purpureum x Pennisetum americanum*).

Top Bdr Magar, farmer leader in Gajurichhap, beside his well weeded trial plot that show the challenging conditions for species establishment and development.

Raju Chhetri (NAF field officer) beside trial plot in Chankubesi where it was decided to include Tanki within the species under evaluation.

Summary
This report covers the fourth joint field work and data analyses in Nepal for the project "Strategies for the improved production of fodder during the dry season, using participatory research techniques". The project is funded by the Department for International Development (DFID), Renewable Natural Resources Knowledge Strategy (RNRKS) through the Livestock Production Programme (LPP).

The purpose of the visit was threefold, to share data analyses to date with collaborators and discuss further needs in data checking and analysis, to visit the new on-farm trials and document their location and layout, and to follow-up questions raised by the initial analyses in the field.

Nepal Agroforestry Foundation (NAF) and the Department for Forest Research and Survey (DFRS) have continued to make excellent progress in completing the bimonthly surveys and entering data from these surveys into the agreed Excel formats. The system for crosschecking the entered data has continued and has now been completed for all data from the eight surveys.

Background
The research project is funded, from September 1997 for 3 years, under the RNRKS Programme of DfID. The project aims to develop improved strategies for the use and production of fodder resources in the mid-hills of Nepal, in close collaboration with farm households with different livestock and resource holdings. Research findings will map fodder use within household farming systems, and indicate the relative importance of off- and on-farm resources in supporting livestock production in terms of quantity of fodder, nutritional composition and seasonal availability.
The project will also consider the impacts of community forestry initiatives on the immediate and longer-term availability of on- and off-farm fodder resources. In particular it will look at the impact on management practices, specifically livestock management, on private agricultural land. This will contribute to the development of integrated management strategies for the improved use and production of fodder resources for increased livestock and farm productivity.

Progress with visit objectives
1. The data summary graphs in Excel and initial analyses in SPSS were discussed with collaborators, and hard and electronic copies provided. Areas requiring further analyses were explored, as was the need for further checking outlying figures in animal feed offer rates. Further information on weight of bharis for different fodder types, % dry matter content and consumable fraction is being sought.

2. All field sites were visited and activities discussed with farmers' groups and NGOs. The new on-farm trial sites (10 per village) were visited and the number and location of surviving seedlings and slips mapped (See appendix 1). Farmer's initial evaluation and how they had harvested different species was noted.

3. At farmer group level, presence of crossbred livestock, concentrate composition, ploughing patterns and management of crops for thinnings and green fodder was clarified.

4. Individual financial points were clarified with collaborators. Spending has remained within budget for the last six months.

5. The procedure for soil sampling and analysis from the proposed experimental plots was again discussed and further clarified. Composite samples from the ends and middle of the 20m terraces will be taken at a depth of 0-20cm and 20-40cm, in a field trip to be arranged soon after Desain. Concurrently a history of fertiliser application and crop production from the terrace will be collected.

Activities planned for the forthcoming six months:

A. On-farm experiment documentation and follow-up

1. Finalisation of farm location maps

Amendments to farm location maps due to changed location of some research plots and revised land holding sizes (cross-reference one-off survey data, Ben's cross-checking, information from recent field trip and karbari land). Send copy to NRI.

FRSD

2. Soil analysis of each household's plot

Composite soil samples to be taken from each experimental area at two depths, 0-20cm and 20-40cm. Mr Malla has details of analyses to be made.

Feedback to individual household and group findings of the analyses and implications for soil fertility and subsequent management. **FRSD**

3. Monitoring of experimental plots.

a) Monitoring conducted during this visit to be published in forthcoming 5th Report **NRI**

b) Experimental plots to be monitored every 3 months to record seedling survival, height, and general condition of seedlings and plot. Ask farmer about any harvesting carried out, both on the experimental plot and from other areas of the land. Document when different species are cut, how much fodder is collected and which animals are offered the fodder, in what kind of mixture. Clearly indicate which information refers to the experimental plot and which to plantings on other areas of land. Use individual plot diagrams to record data so that progress of individual seedlings is followed. Enter into computer and retain original copies. Enter species heights into separate Excel tables for calculation of species growth rates at different locations. **FRSD/ NAF**

Species identification and fodder quality analysis

1. Continue verification of fodder species list (matching of local terms with Botanical names/ identification)

Try contacting researchers within the Department of Botany/ Godaveri herbarium/ Tribuvan University. **NAF/FRSD**

2. Crosscheck commonly used tree fodders from bimonthly survey with species for which nutrient content is available. Identify which important tree fodders in the research areas need to have nutrient analyses taken. Take representative samples during the middle of the main collecting period (sample from at least 5 trees and take range of material from different heights and aspects). **FRSD**

Further analyses of bimonthly survey data

1. Checking of dry matter intake figures and adjustment as per discussions during present visit **NRI**

2. Further interrogation of the data as discussed during this visit. Feed back to all for comments/ discussions **NRI**

D. Follow-up support and training for village groups

1. Veterinary training for NGO reps, 7-8th October 99 **NAF**

2. Follow-up TOT, vegetable cultivation and fruit propagation training, December 6-10th. **NAF**

3. Follow-up support by NGOs to village development activities as outlined in agreements with NAF. **NAF**

E. Preparation for Workshops to discuss project findings and feed-back to farmers' groups

1. Feed-back at village level to farmers' groups main findings from the project and specific findings of relevance for improving fodder supply strategies in their village. Prepare leaflets for distribution at village level. Facilitate discussions on benefits/ farmers opinion on the research undertaken, training and fodder cultivation activities. To be held in March/April **NAF/FRSD/NRI**

2. Feedback and discussions at farmer leader and NGO representative level, workshop to be held in Kathmandu in April/May. **NAF/FRSD/NRI**

3.National-level workshop for contributions from interested National organisations on improving farm-level fodder supplies, addressing fodder deficits, improving livestock feed strategies and intensifying livestock systems. To be held in September 1999. Identify invitees (starting with previous fodder working group members), send out initial invitations in December with request for abstracts by end February. Select promising abstracts and request full papers by end May. Compile these into proceedings (special edition of Banko Janakari?) and publish by end August, ready for workshop in September. **FRSD/NAF/NRI**

F. Documentation of activities to date

1. Finalisation of literature review and publication **NRI**

2. FRSD idea for preparation of summary document for the bimonthly surveys as joint publication. **NAF and FRSD**

Progress with survey data collection, checking and analysis

Bi-monthly survey data collection and checking

The monitoring of representative farmers' feed allocation and perceived fodder deficit over the various seasons of the year is now complete. Eight bi-monthly surveys, covering a 14 month period, have been conducted. The survey was extended beyond one year, because it was found that different interpretation of some survey questions had initially occurred, by both farmers and field workers.

Work remaining on data collection and checking:

1. Finalise data on land holdings and include this within data analysis.
2. Include information on household size and labour availability within analyses.

Suggestions for further analysis of bi-monthly survey data

1. What are they key shortages (which fodder(s) when) that limit productivity for milk production in a) buffalo and b) cows (Chankubesi).
2. Similarly look at feeding patterns for those households with perceived shortage and those without, for meat production in goats. If enough data, divide up producers between those producing none, those producing one per year, 2 per year and greater than 2.
3. Look at goat sales in terms of income. Feeding patterns per income pre goat, i.e. difference in feeding between those producing big and small goats.
4. Village factors in defining shortages, verses HH factors. Shortage/ no shortage
5. Effect of farmers having khet land versus no khet land on shortages.
6. Livestock holding per land holding for each household, village and as a combined figure.
7. Effect of size of land holding on fodder allocation rates (independently of livestock numbers and as a combined value, livestock numbers per land area).

Progress with on-farm trials

On-farm trials have been established in each village, one with each of the farmers involved in the bimonthly survey. A total of 49 trials have been established, 3 of the originally selected farmers having moved, or in one case withdrawn, and two interested farmers found to replace them. Species chosen for evaluation and spacing distances vary between villages. Within villages every effort has been made for the same species to be planted at the same spacing along the farmer's chosen 20m length of terrace. The terrace locations vary in aspect, height and soil type. Soil type will be defined by the planned analysis in November.

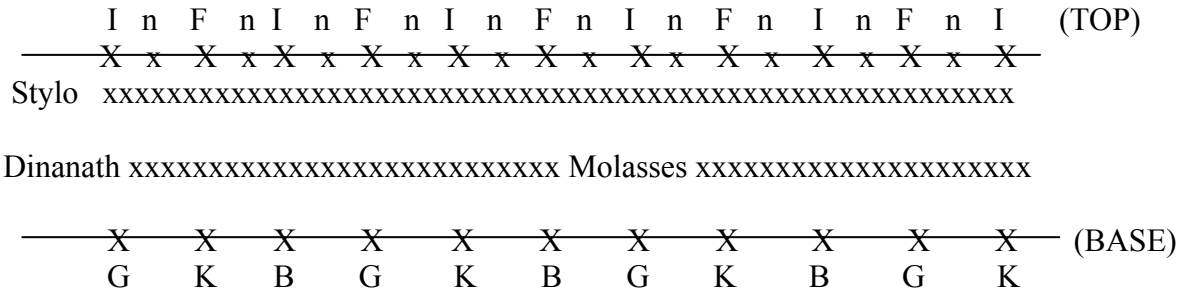
Design of on-farm experiments at each of the five research sites

(Actual planting patterns and species survival in September 1999 at individual farm level are given in Appendix 1)

Gauthale

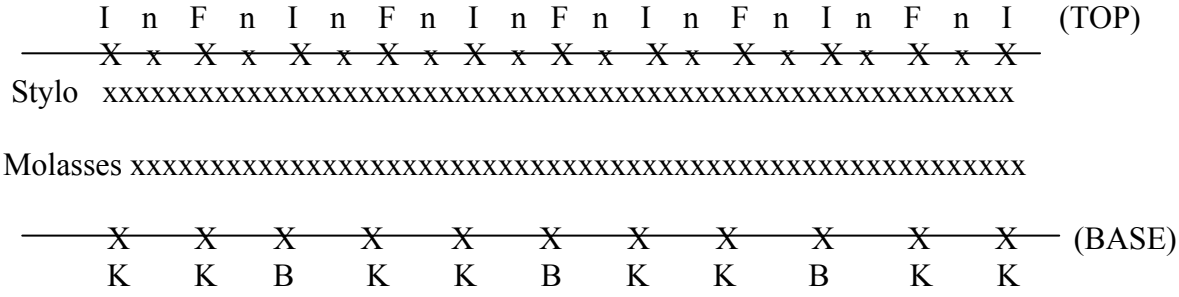
Farmers have chosen to include Guazuma in their trials because it has been found to grow well at this location. It provides a preferred type of fodder, similar to Badahar (*Artocarpus lakoocha*), and can also be used as a medicine, for digestive ailments. Some farmers have planted the Ipil (*Leucaena diversifolia*) at double the density recommended and one of these has incorporated Ipil seedlings planted last year at one meter spacing into the current design.

The individual farm maps (Appendix 4) clearly mark where this has occurred. Germination of the direct seeded Bhatmase (*Flemengia congesta*) has been poor on most farms.



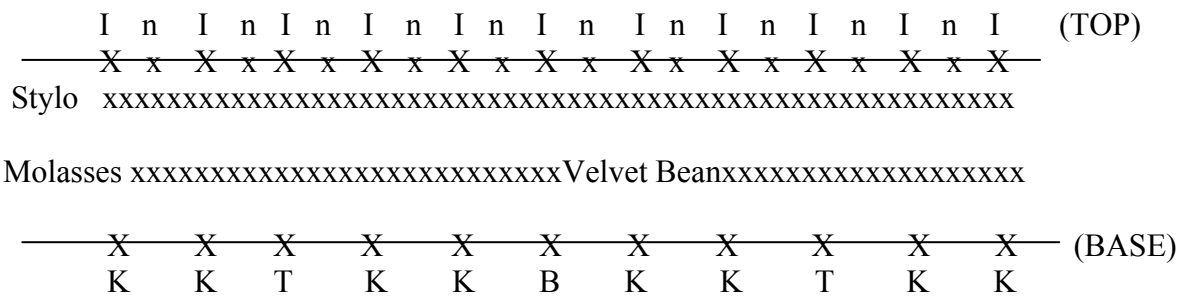
Gajuri Chhap

Plots planted according to plan by all farmers except Sumitra Magar (HH2) who conducted her own plan. Top Bdr Magar's original plot was taken out by a land slide and so the present plot is a second choice, planted several weeks later than the original. This second site has a number of mature trees already present (quite shaded) and he was unable to plant NB21 or the grasses as there was no material/ seed left.



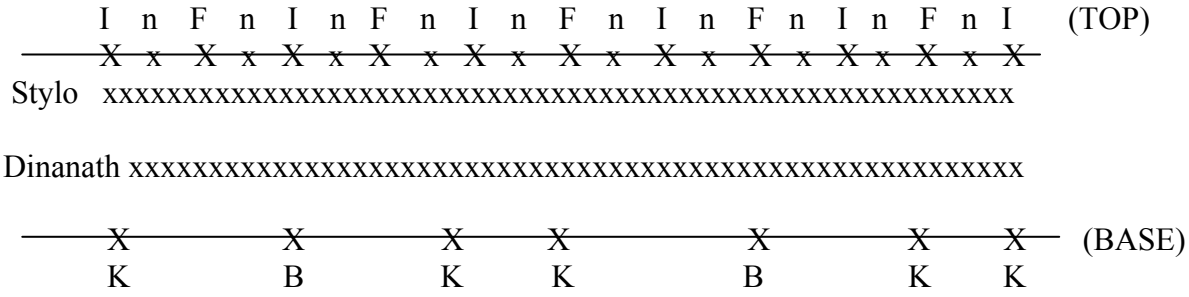
Chankhubesi

Production from local nurseries was very poor this year and so many of the seedlings had to be brought in from outside nurseries for the trials. Farmers took interest in the trials because the seedlings were provided, but fodder cultivation is not a priority for them. They are very occupied with vegetable cultivation, which is an important income source. Farmers favour species that can by direct seeded, or planted like the grass slips. Farmers say that nursery cultivation requires too much work and water.



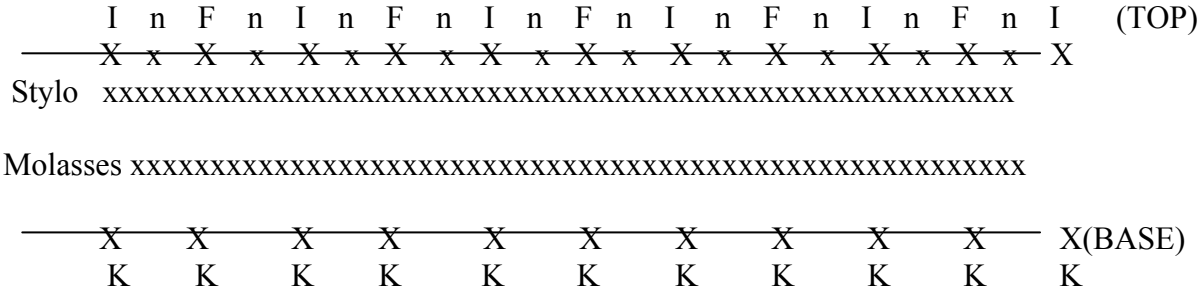
Ange

Farmers decided to plant Badahar (*Artocarpus lakoocha*) at 2m spacing distance, rather than the 1m spacing used in other villages, as this grows into a big tree. Kimbu (*Morus alba*) was planted at the regular 1m spacing distance.



Tawari

Trial plots planted as per plan except for households 2,8 and 9 who planted Ipil at 1m, rather than 2m spacing. Mixed success with direct sowing of Bhatmase (*Flemengia congesta*) as on some farms there is good germination, but on others very poor.



Summary of farmers ranking of species from experimental plots as of September 1999

NB. All farmers did not make rankings on the same basis. Although asked to rank species within the experimental plot, some included all the fodders of which they had experience. Others, thinking clearly of the experimental plot, said that it was too soon to choose between them because they did not have experience of feeding all the species. These rankings consequently tend to be biased towards those species that were introduced first last year (rather than this), as farmers have experience of harvesting and feeding them. Also, there is a bias towards species that are productive more quickly, e.g. grasses (however this is also an important farmer's choice criterion).

Some information was collected on when farmers had harvested fodder from the new species, but this was only available from a few farmers in each village. Further information will be sought from all farmers after the next monsoon and combined with previous data to produce fodder availability and time of use charts for each village.

Gauthale

Name	Ipil	NB21	Flemengia	Kimbu	Badahar	Guazuma	Stylo	Molasses	Dinanath
Thulo Toya Magar	1	3				2			4
Krishna Bdr Magar	1			X disturbs bari				2	
Chhabi Bdr Magar									
Lok Bdr Magar		2		3	1	4			
Kul Bdr Magar									
Bhim Bdr Magar	1	3		2					
Yam Bdr Magar									
Lal Bdr Magar	3	1		4				1	2
Khum Bdr Magar	1	1							
Dhan Bdr Magar	3	2		4					1

Ipil appears most favoured species overall. NB21 is the preferred grass, with Dinanath also ranked highly by those farmers that have tried it. Molasses well liked by those who already have experience of it. These grass species have been more recently introduced and farmers are just finding out about their performance and suitability for different farming systems. Farmers have reservations about Kimbu due to the disturbance that its roots can cause to ploughing operations on the lower terrace, and its negative impact on soil fertility.

Gajurichhap

Name	Ipil	NB21	Flemengia	Kimbu	Badahar	Stylo	Molasses	Dinanath
Budhi Bdr Koirala	1	3					2	
Sumitra Magar					1			
Top Bdr Magar								
Hari Bdr Magar	1	1						
Man Bdr Koirala								
Lila Bdr Magar	1							
Ek Bdr Magar		1		2				
Ganesh Bdr Magar	3	1		2				
Ammar Bdr Magar		2			1			
Dhan Bdr Magar	1	(3)		2				

Ipil most favoured species, also the one that they have most experience with to date. NB21 close second and preferred grass. Badahar preferred fodder of indigenous species. Again farmers have reservations about Kimbu because of horizontal root growth that interfers with ploughing. Tree fodders at present preferred to cut grasses.

Chankubesi

Name	Ipil	NB21	Flem engia	Kimbu	Badahar	Tanki	Velvet bean	Molasses	Dinanath
Menuka Aryal	4	2				3		1	
Subhadra Koirala				1	2				
Chhetra K Tamang		1			2				
Kaili Tamang			1					2	
Sushmita Parajuli		1						2	
Sharada Parajuli		1						2	
Laxmi Thing									
Parvati Gimire					3			1	2
Chanda K Tamang			2	1	3				
Mana M Magar				3			2	1	

Most popular species Molasses, followed by NB21. Both grasses are dependent on good fertility for good production. Generally introduced species are preferred to indigenous because these start being productive more quickly. Relative performances may change as the species mature.

Ange

Name	Ipil	NB21	Flemengi a	Kimbu	Badahar	Guazum a	Stylo	Molasses	Dinanath
Bhim K Khadaka		1						1	
Santa K Khadaka		1							2
Rani Tamang		1	2						
Fulthunga Khadka		1							2
Man K Khadaka				2	2			1	
Dev K Khadaka									
Shuku Rani Lama									
Lok K Khadaka		2	1						
Sabitri Khadka									
Ram M Tamang	2	1	4					3	

Several farmers said that it was too soon to rank the different species. They had little experience from previous year plantings because of the high mortality experienced during the long dry season last year. Grasses generally preferred at this early stage to tree fodder, with NB21 most popular, followed by Molasses

Tawari

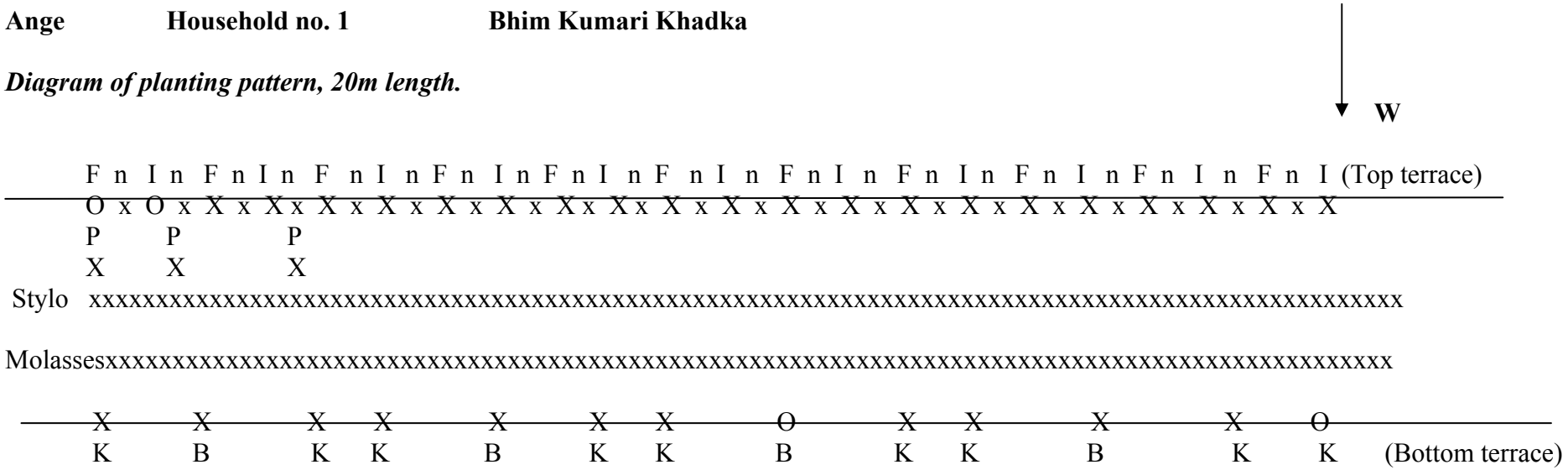
Name	**Ipil**	**NB21**	**Flemengia**	**Kimbu**	**Sunnhemp**	**Guazuma**	**Stylo**	**Molasses**	**Dinanath**
Kabita Tamang		1	3					1	
Anita Tamang									
Sunita Tamang									
Rupadevi Bhujel		2	3		*			1	
Chameli Tamang			2					1	
Samjana Tamang	4		1		2			3	
Ranjana Tamang				1				2	2
Laxmi Magar									
Urmila Magar				2				1	3
Rumila Tumsing				3				1	2

Molasses by far the most preferred species and does seem to do particularly well at this location. Flemengia 2nd choice, closely followed by Kimbu. Sunnhemp was not included in the trial, because initially farmers thought that the fodder was only palatable to goats. Now other animals have become accustomed to the new species and they have found it a good fodder for cows and buffalo too (satisfies hunger for a long time). It has become popular with several farmers who are propagating it on their terrace edges (hence inclusion in ranking although not in formal experiment).

Appendix 1 Individual maps of on-farm trial sites

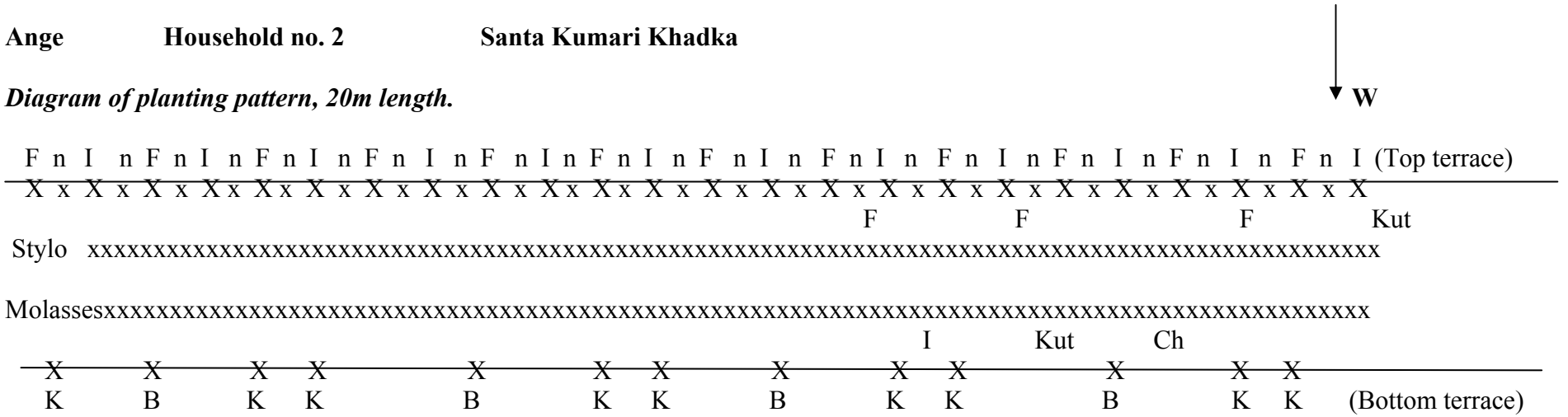
Ange **Household no. 1** **Bhim Kumari Khadka**

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	Site well weeded
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Small and yellowish
n	NB21 Pennisetum sp.	Cut once since sowing
F	*Flemengia congesta*	Growing well, looks healthy
K	*Morus alba* (Kimbu)	Leaves yellowish
B	*Artocarpus lakoocha* (Badahar)	Mother-in-law cut the Badahar seedlings while collecting grasses, but will probably resprout
Stylo	*Stylosanthes guianensis*	Cut once since sowing
Molasses	*Melinis minutiflora*	Cut once since sowing
P	Older Pati trees already growing on the terrace	

Molasses and NB21 are prefered as they are very good for milk production.
NB21 is liked because of its quick growth. Stylo, Molasses and NB21 are fed to all livestock
An additional 100 seedlings of Flemengia and 100 of Ipil have been planted in the Ghar and Tallo bari land.



Ange **Household no. 2** **Santa Kumari Khadka**

Diagram of planting pattern, 20m length.

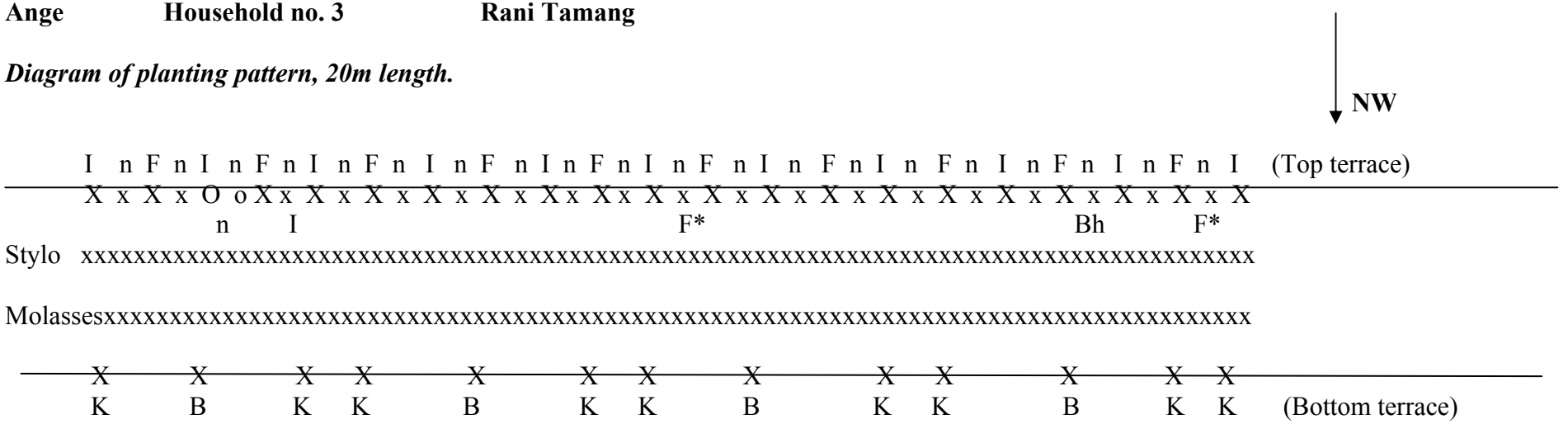
```
                                                                        |
                                                                        v W

 F n I  n F n I  n F n I  n F n  I  n F  n I n F n I  n F  n I  n  F n I  n  F n  I  n F n  I  n F n  I  n  F n  I (Top terrace)
_________________________________________________________________________________________________________________________________
 X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X
                                                  F         F                F         Kut
Stylo xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Molassesxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
                                                     I       Kut      Ch
 ___X_______X_______X___X_________X_______X___X_______X_______X___X_________X_______X___X________
    K       B       K   K         B       K   K       B       K   K         B       K   K    (Bottom terrace)
```

Key:		**Condition**
X	tree or shrub seedling	Site well weeded
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Seedlings in good condition
n	NB21 Pennisetum sp.	Good growth, cut once since sowing
F	*Flemengia congesta*	Growing well, looks healthy
K	*Morus alba* (Kimbu)	Seedlings in good condition
B	*Artocarpus lakoocha* (Badahar)	Seedlings in very poor condition, some with no leaves remaining
Stylo	*Stylosanthes guianensis*	Good germination, but not prolific
Molasses	*Melinis minutiflora*	Good germination, but not prolific
Kut	*Litsea monopetala* (Kutmiro) tree already growing on terrace	
Ch	Schima wallichii (Chilaune) tree already growing on terrace	

Cutting NB21 on trial plot cut once.
NB21 most preferred species as from previous experience knows that she can cut more than three times a year once it is established and that regrowth is very fast in the rainy season, allowing further cutting after just one week. Dinanath (Pennisetum pedicillatum) second choice (though not included in trial) as can cut three times a year. Both are liked equally by all animals.



Ange Household no. 3 Rani Tamang

Diagram of planting pattern, 20m length.

↓ **NW**

I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I (Top terrace)
X x X x O o X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X
n I F* Bh F*
Stylo xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Molassesxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

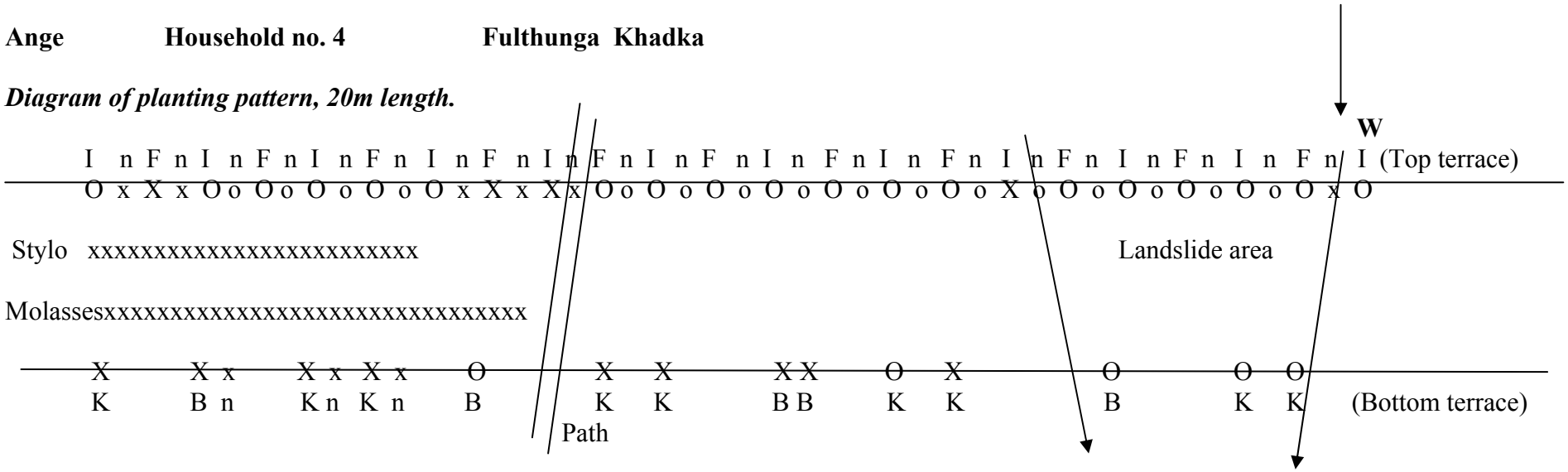
X X X X X X X X X X X X X
K B K K B K K B K K B K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Site well weeded
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Small, poor growth
n	NB21 Pennisetum sp.	Growing well
F	*Flemengia congesta*	Growing well, looks healthy
F*	*Flemengia congesta*	Year old Flemengia looking very healthy, 1m tall, bushy been cut several times
K	*Morus alba* (Kimbu)	Growing well, but leaves look yellowish
B	*Artocarpus lakoocha* (Badahar)	Good growth
Stylo	*Stylosanthes guianensis*	Germinated well and growth some of best at Ange, approx. 30cm tall
Molasses	*Melinis minutiflora*	Germinated well and growth is good, approx 15cm tall.
Bh	Older Buddleja asiatica (Bhimsenpati) tree already growing on terrace	

Rani ranks NB21 first as she has been able to cut twice since planting the slips this year. First cut beginning of August, then again 21st September. It was all fed to goats because there was only a small amount and they like it. When she has more she will feed to all livestock. Most of the NB21 planted last year died during the very dry conditions over winter. Second choice Kimbu as it is easy to propagate during the rainy season and its growing well. She hasn't cut those on the plot yet, but has experience with last years seedlings. She has cut these twice, once at the end of May and again at the beginning of September, and the fodder given to goats. Next year she plans to plant more Kimbu and Badahar and will probably plant NB21 and Molasses as these are looking good. She is waiting to see what other species do well too. She has planted a further 40 Kimbu seedlings on khet land as they grow better on khet than bhari land, doing well where there is sufficient moisture.

Ange **Household no. 4** **Fulthunga Khadka**

Diagram of planting pattern, 20m length.

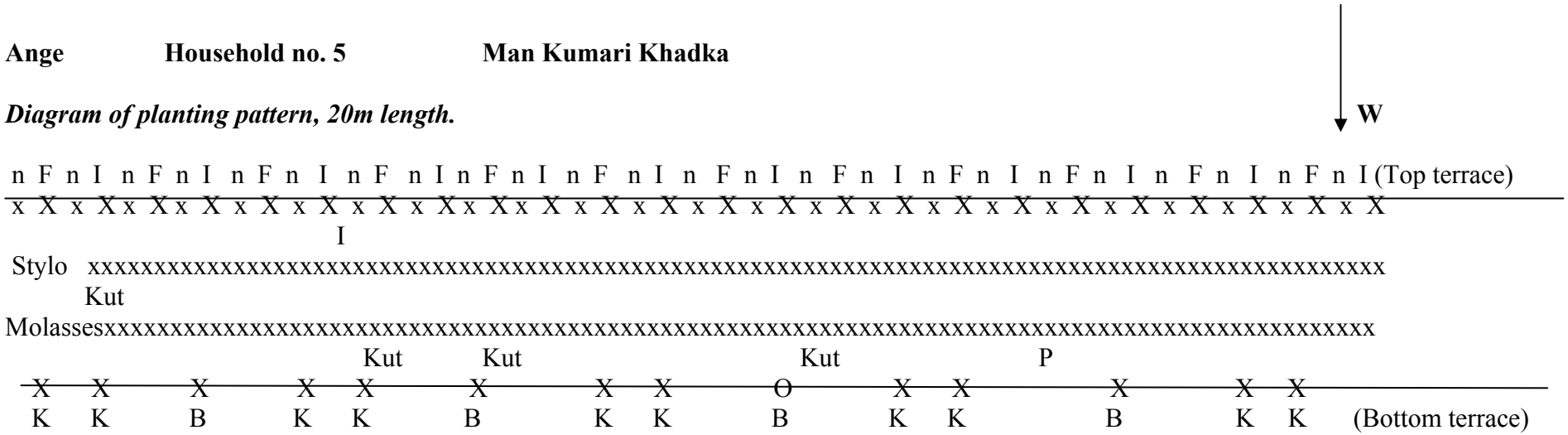


Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good growth, but foliage yellowish
n	NB21 Pennisetum sp.	Good growth
F	*Flemengia congesta*	Growing well
K	*Morus alba* (Kimbu)	Good growth, but foliage yellowish
B	*Artocarpus lakoocha* (Badahar) .	Good growth
Stylo	*Stylosanthes guianensis*	Germinated and growing only at north end of plot
Molasses	*Melinis minutiflora*	Germinated and growing only at north end of plot

Fulthunga's first choice is NB21 because of its fast growth. She has cut it twice and fed the fodder to milking buffalo. From previous experience she knows it helps increase milk yields. The NB21 in the research plot is not doing as well as other cuttings on other areas of her land.
Second choice is Dinanath, although not included in the research plot. It produces a large amount of biomass and it is of good nutrient value. She is unable to rank other species as she does not yet have experience of their use as fodders.

Ange **Household no. 5** **Man Kumari Khadka**

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	condition OK
n	NB21 Pennisetum sp.	Good growth, cut once already
F	*Flemengia congesta*	Growing very well, looks healthy
K	*Morus alba* (Kimbu)	Growing very well, looks healthy
B	*Artocarpus lakoocha* (Badahar)	condition OK
Stylo	*Stylosanthes guianensis*	Good germination, limited growth
Molasses	*Melinis minutiflora*	Good germination and excellent growth, needs cutting
Kut	*Litsea monopetala* (Kutmiro) tree already growing on terrace	
P	Older Buddleja asiatica (Bhimsenpati) tree already growing on terrace	

Molasses most preferred species by Man Kumari because of its quick and prolific growth. Kimbu and Badahar also liked because they easy to propagate and good quality fodder is expected. Other Ipil and flemengia that she has planted in bari land eaten by kumre kira. Would like to plant more Molasses, Kimbu and Flemengia next year. Farmer interested in other species if made available.

Ange **Household no. 6** **Dev Kumari Khadka**

Diagram of planting pattern, 20m length.

Not planted to pattern. Two plantings, with sunnhemp and flemengia planted later to fill gaps.

W

I n F n I n F n I n I n I n I n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I (Top terrace)

X x X x X x X x X x X x X x X x X x X x X x X x X o O o O o O o O o O o O o O o O o O o O o O

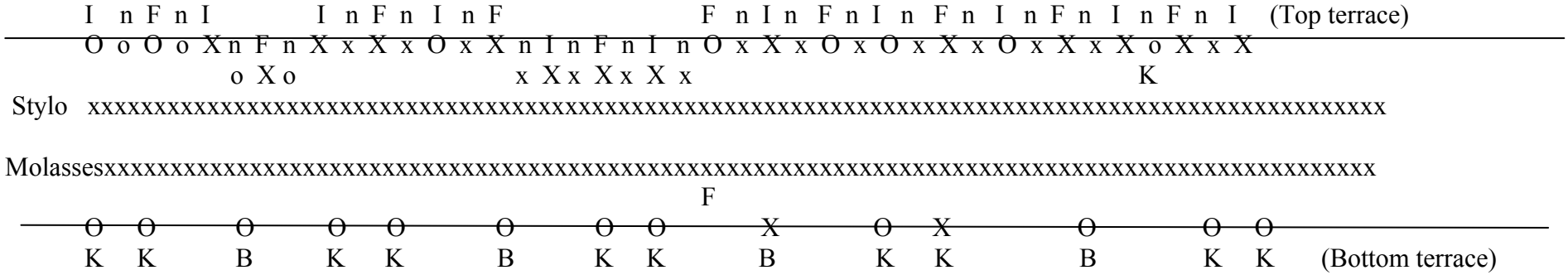
Molasses xxxxxxxxxxxxxxx

S F S S S F F F F F F F F P

O X O X X O X K O K

K K B K K B K K B K K B K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Small, poor growth
n	NB21 Pennisetum sp.	Growing well
F	*Flemengia congesta*	Growing well, looks healthy
K	*Morus alba* (Kimbu)	Leaves yellowish, poor growth
B	*Artocarpus lakoocha* (Badahar)	Poor growth
Stylo	*Stylosanthes guianensis*	
Molasses	*Melinis minutiflora*	
S	Crotalaria juncea (Sunnhemp)	
P	Older Buddleja asiatica (Bhimsenpati) tree already growing on terrace	



Ange **Household no. 7** **Shuki Rani Lama**

↓ **W**

Diagram of planting pattern, 20m length.

Located just below water tap. Wet conditions has led to very good growth of seedlings, but contributed to landslide problems

I n F n I I n F n I n F F n I n F n I n F n I n F n I n F n I (Top terrace)

O o O o X n F n X x X x O x X n I n F n I n O x X x O x O x X x O x X x X o X x X

o X o x X x X x X x K

Stylo xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Molassesxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

F

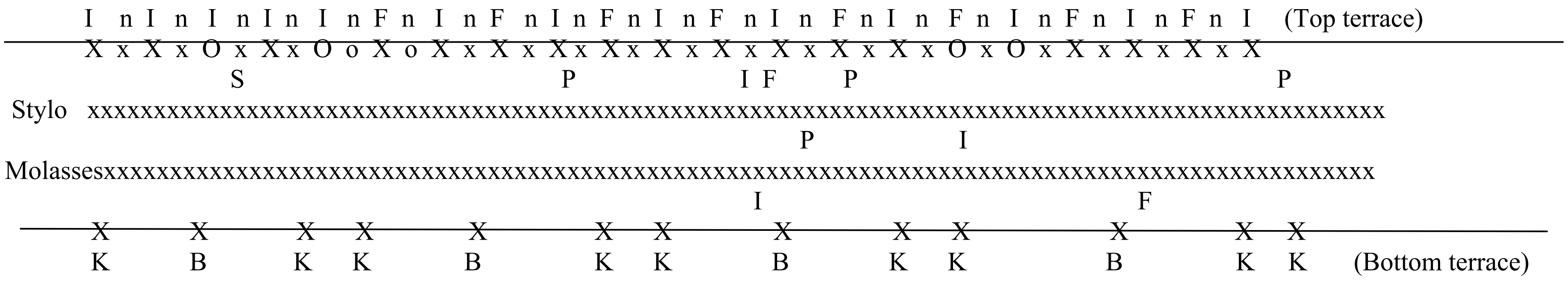
O O O O O O O O X O X O O O

K K B K K B K K B K K B K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Small and yellowish
n	NB21 Pennisetum sp.	Growing well
F	*Flemengia congesta*	Growing well, looks healthy
K	*Morus alba* (Kimbu)	Leaves yellowish
B	*Artocarpus lakoocha* (Badahar)	Mother-in-law cut the Badahar seedlings while collecting grasses.
Stylo	*Stylosanthes guianensis*	
Molasses	*Melinis minutiflora*	

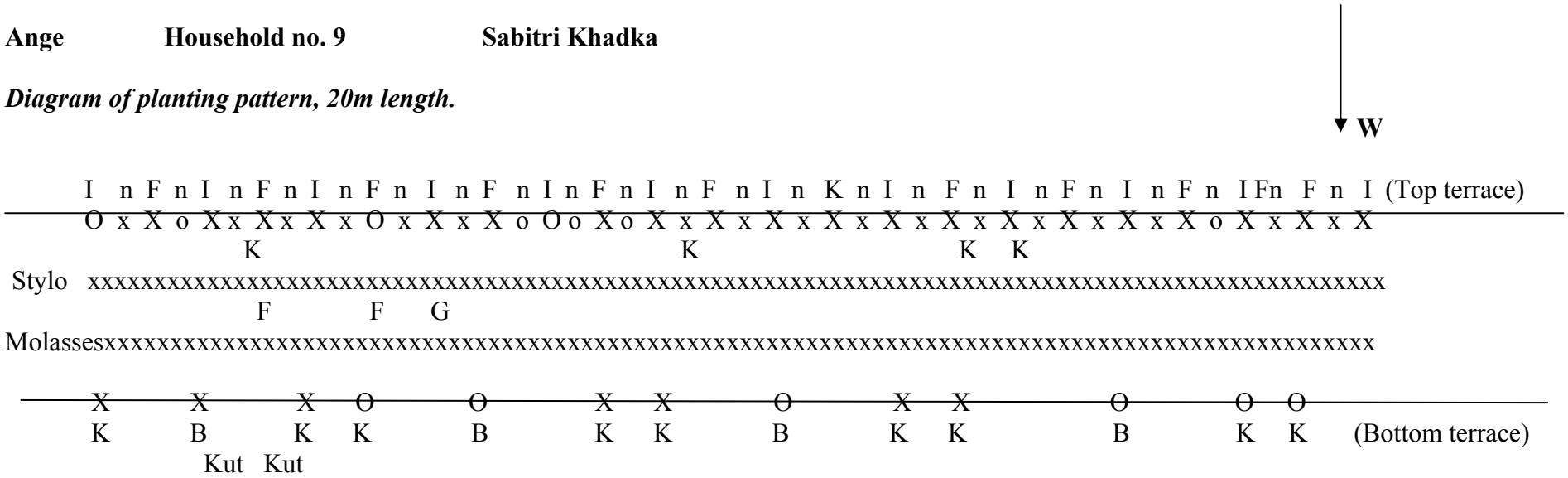
Ange **Household no. 8** **Lok Kumari Khadka**

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Small
n	NB21 Pennisetum sp.	Good growth, needs cutting
F	*Flemengia congesta*	Small
K	*Morus alba* (Kimbu)	Good condition and growth
B	*Artocarpus lakoocha* (Badahar)	OK
Stylo	*Stylosanthes guianensis*	Good germination
Molasses	*Melinis minutiflora*	Good germination
S	Crotalaria juncea (Sunnhemp)	
P	Older Buddleja asiatica (Bhimsenpati) tree already growing on terrace	

From plot considers Flemengia to be growing best. From previous experience she likes NB21 as it can be cut frequently and can be fed to all livestock as all find palatable. Would like to plant more of all species included in the plot again next year.
Have planted out an extra 10 Ipil, 5 Flemengia and 12 Kimbu in her gharbari.



Ange **Household no. 9** **Sabitri Khadka**

Diagram of planting pattern, 20m length.

```
                                                                                   ↓ W

     I  n F n I  n F n I  n F n  I  n F  n I n F n I  n F  n I  n  K n I  n  F n  I  n F n  I  n F n  I Fn  F n  I (Top terrace)
_____O x X o X x X x X x O x X x X o O o X o X x X x X x X x X x X x X x X x X x X o X x X x X x X______________
                 K                                        K                   K  K
 Stylo xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
                  F       F   G
Molassesxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

 _____X_____X_____X___O_____O______X___X_____O______X___X_________O______O__O______________
      K     B     K   K     B      K   K     B      K   K         B      K  K     (Bottom terrace)
              Kut Kut
```

Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Small and yellowish
n	NB21 Pennisetum sp.	Good growth, cut once/
F	*Flemengia congesta*	Good growth
K	*Morus alba* (Kimbu)	Small. Missing seedling eaten by rats.
B	*Artocarpus lakoocha* (Badahar)	Only one seedling remaining, eaten by rats
Stylo	*Stylosanthes guianensis*	Good germination, but not prolific
Molasses	*Melinis minutiflora*	Good germination, but not prolific
Kut	*Litsea monopetala* (Kutmiro) tree already growing on the terrace	
G	*Guazuma ulmifolia* (Guazuma) tree already growing on the terrace	

NB21 cut once from this years cuttings, last years plantings have been cut several times and most fed to buffalo, with a little given to all livestock. She has also cut last year's Kimbu once and fed to all livestock in a mixture. She is reserving her opinion on preferred species until she has had experience of feeding the other species and feeding them to livestock. Planted more seedlings in Gharbari of 4 Ipil, 4 Flemengia, 4 Kimbu and 1 Badahar.

Ange **Household no. 10** **Ram Maya Tamang**

Diagram of planting pattern, 20m length. **SW**

I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I (Top terrace)

O x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X

Stylo xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxx

Molassesxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Kh

X X X X X X X X X X X X X X

K K B K K B K K B K K B K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	well weeded
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Small approx. 0.3-0.6 metres
n	NB21 Pennisetum sp.	Well established, very recently cut
F	*Flemengia congesta*	Growing well, looks healthy
K	*Morus alba* (Kimbu)	Leaves yellowish, not looking very healthy (very sandy, well-drained soil)
B	*Artocarpus lakoocha* (Badahar)	Poor growth
Stylo	*Stylosanthes guianensis*	Sporadic germination, but growing very well where established
Molasses	*Melinis minutiflora*	Good germination and fair growth
Kh	*Ficus semicordata var. semicordata* (Khanyu) tree already established on the terrace	

Ram Maya says that all species are doing well. Her selection of species is largely based on previous experience with some species. 1st choice is NB21 as is very palatable to all livestock and is good in mixture with other fodders. She has cut the slips on the plot twice, once on 1st August and again 27th September. 2nd choice Ipil because again all livestock like it and eat lots. 3rd choice is Molasses because all livestock like it once they have got accustomed to it. 4th choice Flemengia. She will wait and see what is decided in the group before planning for next year.

Gajurichhap: **Household no. 1** **Budhi Bahadur Koirala**

Diagram of planting pattern, 20m length.

E

I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I (Top terrace)

X x X x X x X x X x X x X x X x X x X x X x X x X x X o X x X x X x X x X x X x X o X

F F Kh

Molasses xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

O X X X X X X X X X X X X X X X X X X O X X X X O

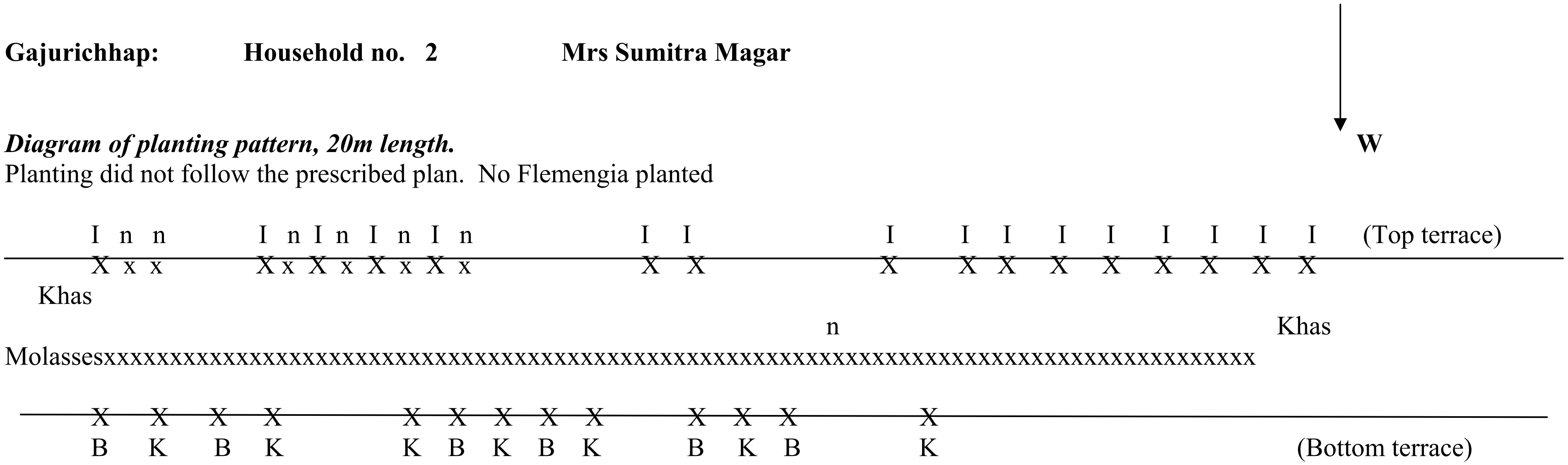
K K B K K B K K B K K B K K B K K B K K B K K B K K B (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Plot very weedy
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Excellent growth
n	NB21 Pennisetum sp.	Excellent growth, over 2 metres in height, urgently in need of cutting, over-mature as fodder.
F	*Flemengia congesta*	Excellent growth
K	*Morus alba* (Kimbu)	Good condition, except at north end of plot where 5 have no foliage left
B	*Artocarpus lakoocha* (Badahar)	Good growth
Stylo	*Stylosanthes guianensis*	No germination of stylo
Molasses	*Melinis minutiflora*	Good germination in central part of plot only
Kh	*Ficus semicordata var. semicordata* (Khanyu)	tree already established on the terrace

Budhi ranks Ipil as the best (from others opinion of it as a fodder). 2nd rank is molasses because of quickness of its growth, producing fodder in a few months. 3rd NB21, for similar reasons. He wants to plant more of Kimbu, Ipil, NB21 and Molasses next year, if they are available.
He has planted approximately 150 seedlings of Ipil > Kimbu > Flemengia, mostly in the Tallo bari. A few Kimbu seedlings have been planted in the khet. NB21, Dinanath, Stylo and Molasses also planted in bari land. He would have liked more Molasses seed.
Fed Dinanath in mixture with other fodders to cows last year.

Gajurichhap: **Household no. 2** **Mrs Sumitra Magar**

Diagram of planting pattern, 20m length.
Planting did not follow the prescribed plan. No Flemengia planted



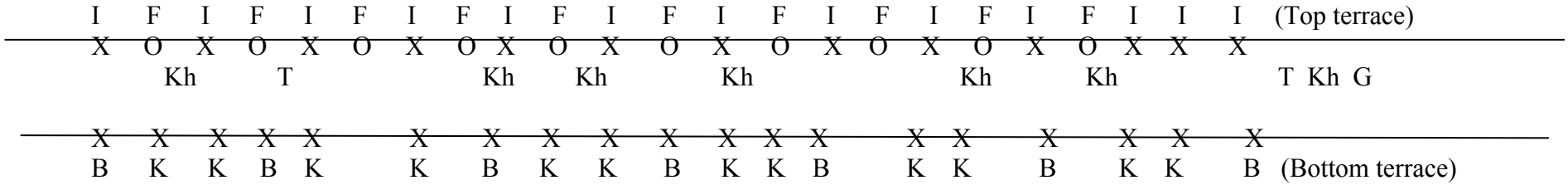
Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good condition and growth
n	NB21 Pennisetum sp.	Well established, has been cut once
F	*Flemengia congesta*	Good condition and growth
K	*Morus alba* (Kimbu)	Good condition
B	*Artocarpus lakoocha* (Badahar)	Good condition
Stylo	*Stylosanthes guianensis*	No stylo sown
Molasses	*Melinis minutiflora*	Germination sporadic along terrace, best in the central area.
Khas	Ficus hispida (Khasreto) tree already growing on terrace	

Sumitra’s species preference is Badahar, from her previous experience.
She has cut and fed Kimbu, NB 21 and small amounts of Molasses and fed to buffalo and goats. Some NB21 cut from plot, other fodders from last year’s plantings on other land.
Also planted 5 Kimbu, 50 Ipil, NB21and sown Molasses in the chihandanda bari. With an additional approximately 150 Ipil seedlings planted in Dhabadi bari.

Gajurichhap: **Household no. 3** **Top Bahadur Magar**

Diagram of planting pattern, 20m length. **S-W**

Initial planting destroyed by landslide, so this second choice site. Several large fodder trees, particularly khanyu already on terrace. No grass seed/ slips remaining, so didn't sow. Flemengia was direct seeded and has not germinated.



Key:		**Condition**
X	tree or shrub seedling	Well weeded
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good condition and growth
n	NB21 Pennisetum sp.	None planted as no slips left on second planting
F	*Flemengia congesta*	No germination (were they sown?)
K	*Morus alba* (Kimbu)	Some die-back
B	*Artocarpus lakoocha* (Badahar)	Good condition
Stylo	*Stylosanthes guianensis*	None sown as no seed left
Molasses	*Melinis minutiflora*	None sown as no seed left
Kh	*Ficus semicordata var. semicordata* (Khanyu) tree already established on the terrace	
G	*Guazuma ulmifolia* (Guazuma) tree already growing on the terrace	
T	*Bauhinia purpurea* (Tanaki) tree already growing on the terrace	

Top Bdr has planted a further approximately 200 Ipil seedlings in other bari land this year, also 150 NB21 slips that he produced himself, from earlier plantings. 30 Kimbu cuttings were also planted out on other land. Another 70 cuttings he gave to other group members who were short.
He has cut previously planted Molasses once, in September and Dinanath twice in August and September. He cut once they were in danger of becoming over mature.

Gajurichhap: **Household no. 4** **Hari Bahadur Magar**

Diagram of planting pattern, 20m length.

E

I n F n I n F n I n F n I n F n I n F n I n F n I* n F n I n F n I n B n I n F n I (Top terrace)

X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X

T

Stylo T

Molasses T T T T

X X O X X X X X X X X

B K K B K K B K K B K (Bottom terrace)

F n B n I n F n I n F n I n F n I n F n I n F n I* n F n I* n F n I* n F n I n F n I (Top terrace)

X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X

Stylo T T T

Molasses

X X X X X X O X X X

K B K K B K K B K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Well weeded
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Planted at 1m spacing, with Flemengia direct seeded between
I*	Last years *Leucaena diversifolia* K-156	Combined into trial design as at approximately 1m spacing
n	NB21 Pennisetum sp.	Very good growth, cut once

F	*Flemengia congesta*	Direct seeded, no sign of any germination
K	*Morus alba* (Kimbu)	Yellowish leaves and some die-back visible
B	*Artocarpus lakoocha* (Badahar)	Good condition
Stylo	*Stylosanthes guianensis*	No sign of any germination
Molasses	*Melinis minutiflora*	No sign of any germination
T	*Bauhinia purpurea* (Tanaki) tree already growing on the terrace	

Has cut NB21 four times, twice in August and twice in September. Only fed to milking buffalo. Would feed to other livestock if sufficient quantities available, but chose to feed small amount available to milking animals. The farmer identified Flemengia as locally available in the forest. It is collected as a fodder. He has several naturally occurring seedlings of Flemengia on his land that he protects and harvests for fodder.
He has planted Dinanath on other land and cuts once a year. He has collected 4-5 bharis of Dinanath this year. This he mixes with other grasses, approximately 25% Dinanath to 75% local grasses such as Musekarki before feeding. Dinanath feed as a sole fodder causes scouring. Dinanath is a much denser grass than the Musekarki. One bhari of Dinanath (50kg) consists of 4 Mutta (volumetric measure of bundle) whereas one bhari of Musekarki (50kg) consists of 8 Mutta.
Previous plantings of Kimbu have been cut and the small amount available fed to goats. He has not fed NB21 to the goats as assumes they will not eat a grass.
He cuts Ipil three times a year if only small poles required, twice a year if the larger poles for animal shed construction required.
His ranking of species puts Ipil first as tree fodder because it grows fast and NB21 first as grass fodder for the same reason.
Further plantings have been made of approximately 200 Ipil on bari land, 20-25 Kimbu and 4 Badahar.

He plans to plant more Dinanath, Badahar and Champ. Also a few more Kimbu and Ipil.

Gajurichhap: **Household no. 5** **Man Bahadur Koirala**

Diagram of planting pattern, 20m length.

NE

n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I (Top terrace)

x X x O x X x X x X x X o X O o X o X o X o X o X o O o X o O o X x O x X x O x X

x

Stylo

Molassesxx xx xx xx xx xx xx xxx xx x x xx x xx x

O X X X X X X X X X X X X X X X X X

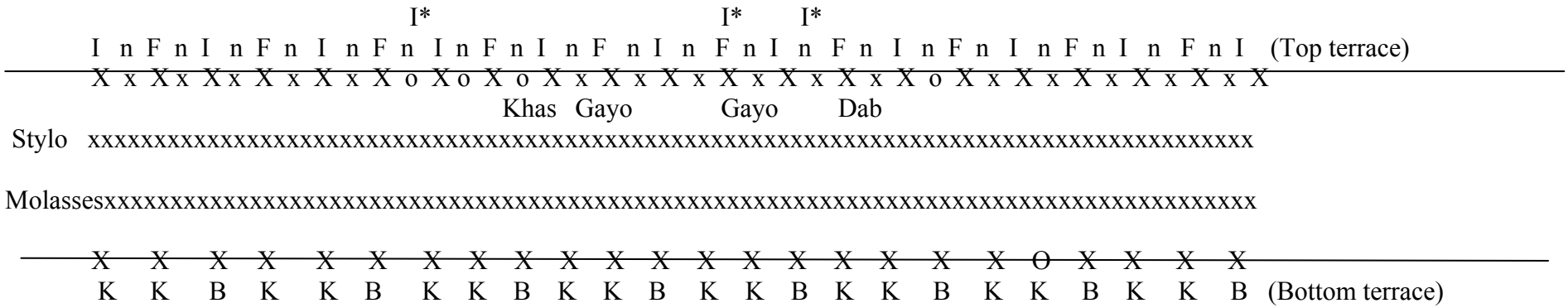
K B K K B K K B K K B K K B K K B K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Very weedy and overgrown
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Poor growth
n	NB21 Pennisetum sp.	Good growth
F	*Flemengia congesta*	Small seedlings
K	*Morus alba* (Kimbu)	Small, overgrown
B	*Artocarpus lakoocha* (Badahar)	Small, overgrown
Stylo	*Stylosanthes guianensis*	No sign of any germination
Molasses	*Melinis minutiflora*	Some sporadic germination to SE end of plot

Man Bahadur likes NB21 best because of its quick growth . Kimbu and Ipil are jointly his second choice because he expects high quality fodder from them. He will plant more of these three species again next year if they are available, together with more Mollasses. He is not yet convinced about Molasses as a fodder because it has not performed well on his land. He has cut NB21 and fed to both oxen and buffalo. He has planted a further 100 Ipil on his gharbari.

Gajurichhap: **Household no. 6** **Lila Bahadur Magar**

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Very good growth and condition
I*	Last year's *Leucaena diversifolia* K-156	Excellent growth, 1-2 metres high, not yet cut.
n	NB21 Pennisetum sp.	Good growth
F	*Flemengia congesta*	Good growth
K	*Morus alba* (Kimbu)	Good growth
B	*Artocarpus lakoocha* (Badahar)	Small, but mostly healthy
Stylo	*Stylosanthes guianensis*	Very good germination
Molasses	*Melinis minutiflora*	Very good germination
Gayo	Bridelia retusa (Gayo) tree already growing on terrace	
Dab	Older Garuga pinnata (Dabdabe) tree already growing on terrace	
Khas	Ficus hispida (Khasreto) tree already growing on terrace	

One of few plots where Stylo and Molasses have germinated well. Particularly marked that germination is o good on this plot, but not on Ganesh's and Ammar's that are directly above this one with similar aspects and soil type. Top Bdr (leader farmer) considers this to be due to Lila's careful

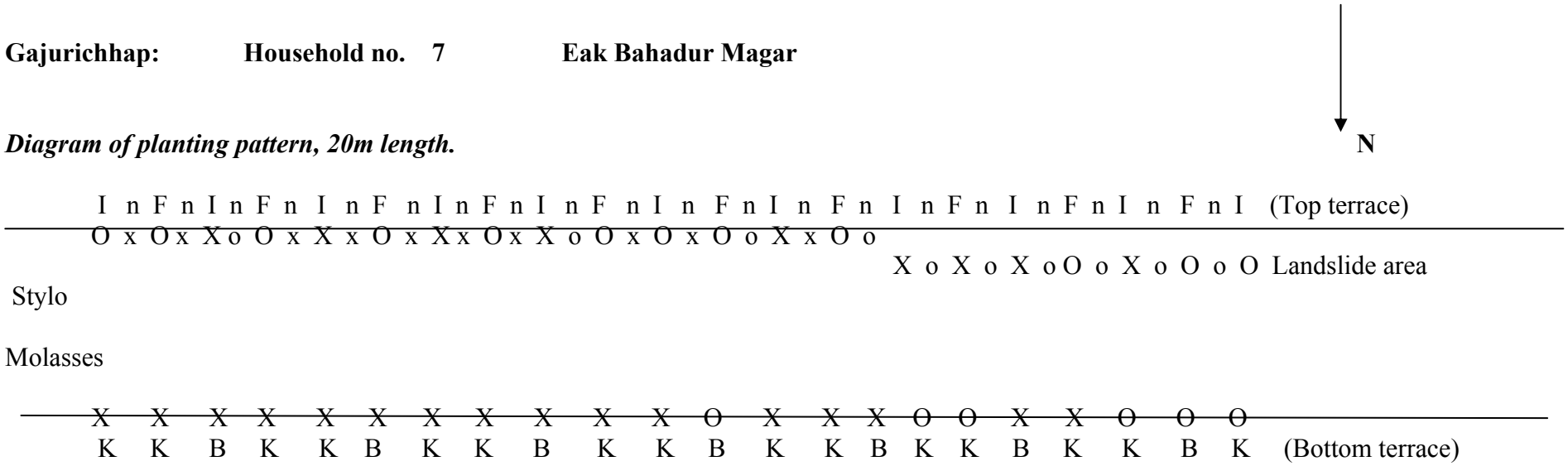
preparation before sowing the grass seed. He completely weeded the plot of local grasses and so planted into bare soil. Other farmers cleared only a narrow band of the terrace, where the seeds were actually sown.

Lila considers that the Ipil is growing best as present and he thinks that this makes a good fodder. NB21 has been cut once, but Lila doesn't know which livestock were fed as this was done by his chidren.
Lila is keen to plant more fodder species next year, but he is waiting to see the performance of the different species over a full year before deciding exactly what to plant.

Other planting of fodder species on his land this year has consisted of approximately 250 Ipil, 40 Badahar, Molasses and Dinanath seed and NB21 slips. All were planted within his ratomate bari.

Gajurichhap: **Household no. 7** **Eak Bahadur Magar**

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	Well weeded, face almost scraped
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good growth of remaining seedlings
n	NB21 Pennisetum sp.	Good growth, cut once
F	*Flemengia congesta*	Very few have germinated and survived. Plot too overgrown for direct seeding
K	*Morus alba* (Kimbu)	Rather etiolated growth in heavy shade of established fodder trees
B	*Artocarpus lakoocha* (Badahar)	Ok growth
Stylo	*Stylosanthes guianensis*	No successful germination visible
Molasses	*Melinis minutiflora*	No successful germination visible

Many established fodder trees on the terrace (not yet marked on map…add on next visit). These have shaded the new seedlings and caused etiolation in some, particularly the Kimbu. The plot has now been weeded, but previously was very overgrown and this may have supressed grass germination and growth, there is no Stylo or Molasses visible.

Of the two species that he has experience of feeding to livestock he ranks NB21 first and Kimbu second. He reserves judgement on other species until they have reached harvesting stage. Eak Bdr considers that he now has enough NB21, wont plant any more, but will consider other species next year.

Gajurichhap: **Household no. 8** **Ganesh Bahadur Magar**

Diagram of planting pattern, 20m length.

E

I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I (Top terrace)

O x X x X x X x X x O x O x X x O x O x X x O x O x O x X x X x X x O x X x X x X

Stylo

Molasses

X X X X X X X X X X X X X X X X X X X X X X X X X X

K B K K B K K B K K B K K B K K B K K B K K B K K B K (Bottom terrace)

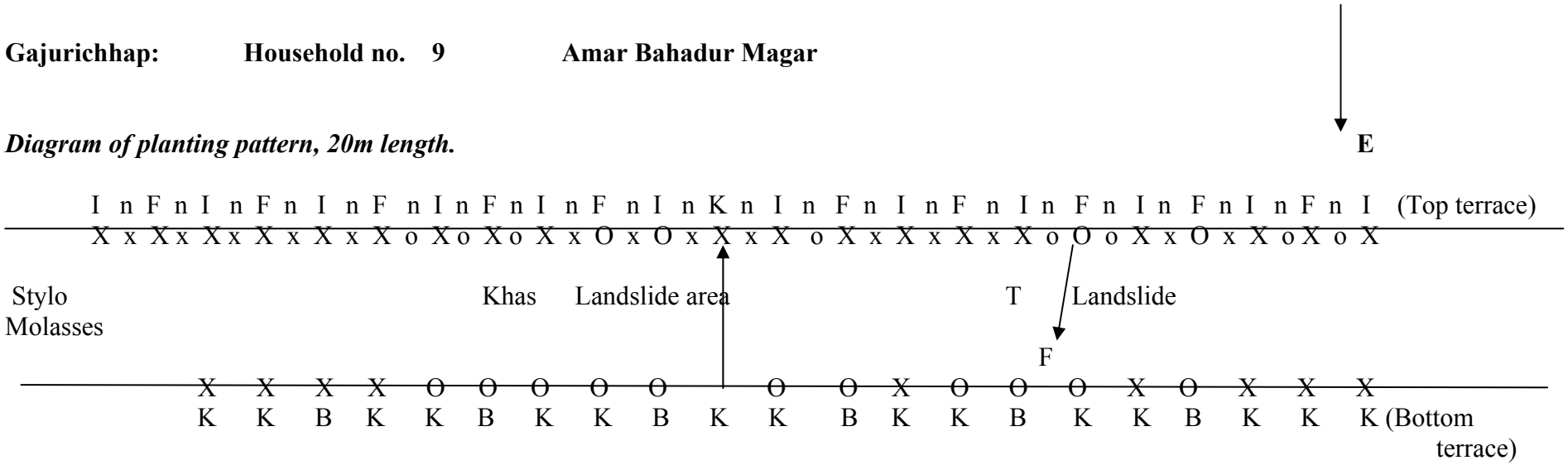
Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good growth and condition
n	NB21 Pennisetum sp.	Excellent growth
F	*Flemengia congesta*	Good growth and condition
K	*Morus alba* (Kimbu)	Good growth, but rather spindly
B	*Artocarpus lakoocha* (Badahar)	Good growth and condition
Stylo	*Stylosanthes guianensis*	No germination visible (sown into unweeded terrace face)
Molasses	*Melinis minutiflora*	No germination visible (sown into unweeded terrace face)

Most preferred species is Ipil, followed by Badahar . He has experience with them both (Badahar not since childhood) and considers them both good quality fodders. He wants to plant more of both these species next year, together with Nimaro (Ficus auriculata). He has cut Ipil from previous plantings and fed to all livestock.

A further 500 or so seedlings of Ipil, Tanki and Kimbu have been planted this year in his Gandrang Ghundrung bari and Gairigoan bari. He has problems with landslides, however, in both these areas.

Gajurichhap: **Household no. 9** **Amar Bahadur Magar**

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	Partially weeded, but still overgrown before the first landslide, to the southern end
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good growth and condition
n	NB21 Pennisetum sp.	Mostly good growth, cut once
F	*Flemengia congesta*	Good growth and condition
K	*Morus alba* (Kimbu)	Very small and yellowish where still surviving
B	*Artocarpus lakoocha* (Badahar)	Only one surviving, good condition
Stylo	*Stylosanthes guianensis*	No germination visible (sown into an unweeded terrace face)
Molasses	*Melinis minutiflora*	No germination visible (sown into an unweeded terrace face)
Khas	Ficus hispida (Khasreto) tree already growing on terrace	
T	*Bauhinia purpurea* (Tanaki) tree already growing on the terrace	

From his previous experience, Amar Bdr identifies Badahar as the best fodder species. From the trial he likes NB21 which he has been able to cut already. This was fed to all livestock in a mixture with other fodders. He plans to plant more next year, particularly Badahar. He is growing to like Kimbu (he didn't before) seeing how it performs on other farmers' plots.
A further 300 Ipil seedlings have been planted in his Ghar, Tallo, Dhad and Ratomate bari areas. Further slips of NB21 and Molasses seed have also been sown.

Gajurichhap: Household no. 10 Dhan Bahadur Magar

Diagram of planting pattern, 20m length. **E**

No Flemengia has germinated, position for Flemengia taken from surviving pits.

Khan

I n I n F n I n I n F n I n I n F n I n I n I n I n F n I n F n I n F n I n F n I n F (Top terrace)

X o X x O x X x X x O x X x X x O x X x X x X x X x O x X x O o X x O x O x O x X x O

Stylo Khan Khan
Molasses

X X X X X X X X X X X X X X X X X X X X X X

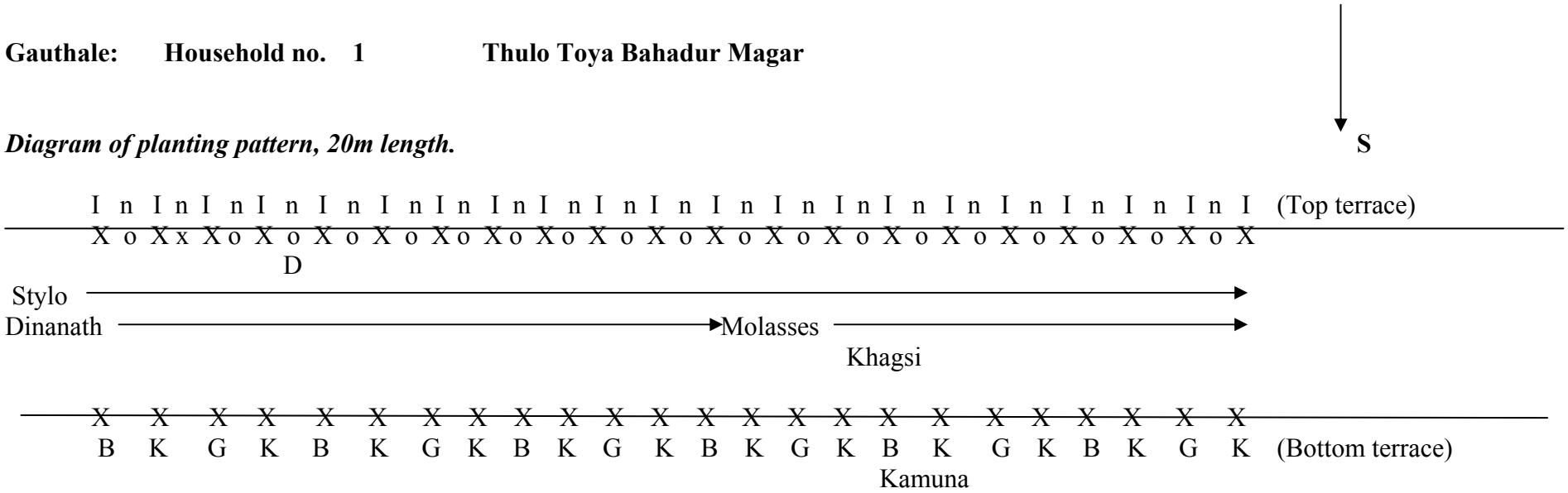
K K B K K B K K B K K B K K B K K B K K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Very weedy, particularly at the top of the terrace, with pumpkin smothering and mixture of local grasses and legumes (Mucuna-like plant) He has weeded apparently, but not hard.
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good growth of those remaining, 1-2 m in height
n	NB21 Pennisetum sp.	Mostly good growth, not yet cut
F	*Flemengia congesta*	No success in germination of Flemengia from direct seeding?
K	*Morus alba* (Kimbu)	Well established, but etiolated under the shade of three big trees.
B	*Artocarpus lakoocha* (Badahar)	Good condition
Stylo	*Stylosanthes guianensis*	No germination visible (sown into an unweeded terrace face)
Molasses	*Melinis minutiflora*	No germination visible (sown into an unweeded terrace face)
Khan	*Ficus semicordata var. semicordata* (Khanyo)	tree already growing on terrace

Dhan has not used any of the fodders planted this year yet. Ipil looks the best of the species in terms of growth so far. He has experience from feeding Kimbu and Ipil from plantings made last year on other areas of his land. He likes Ipil more than Kimbu because it also provides poles and fuelwood as well as fodder. He is waiting to see how NB21 is as a fodder. All animals eat kimbu in his experience. The small amount of Ipil he harvested he fed all to milking buffalo. The Stylo and Molasses didn't germinate, but he is not too disappointed as he is more interested in tree fodders. He would like more cut grasses too. In further plantings his first choice is for Ipil, but would like to plant some Badahar and Neemaro too.

Gauthale: Household no. 1 Thulo Toya Bahadur Magar

Diagram of planting pattern, 20m length.

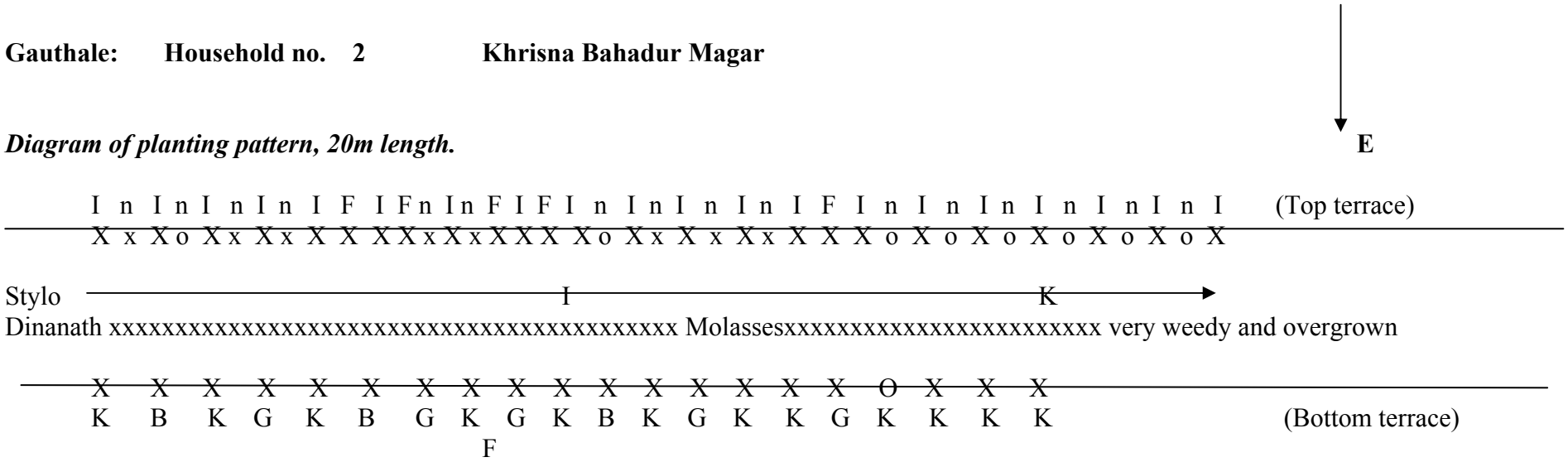


Key:		**Condition**
X	tree or shrub seedling	Very weedy (was planning to weed for our visit, but due to schedule changes we were 2 days early)
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Small, but healthy 1-2 ft in height
n	NB21 Pennisetum sp.	Spindly tall growth, not luscious. Majority about 2 metres, needs cutting to encourage tillering
F	*Flemengia congesta*	Only one seedling has managed to geminate and survive
K	*Morus alba* (Kimbu)	Surviving, but growth not good
B	*Artocarpus lakoocha* (Badahar)	Ok condition
G	*Guazuma ulmifolia* (Guazuma)	Excellent growth
Stylo	*Stylosanthes guianensis*	No visible germination
Molasses	*Melinis minutiflora*	No visible germination
D	*Pennisetum pedicillatum (*Dinanath)	Only one seedling has managed to germinate and survive
Khagsi	*Streblus asper*	(Khagsi) tree already growing on terrace
Kamuna		(Kamuna) tree already growing on terrace

He prefers Ipil from his previous experience with growing and feeding to all animals. 2nd choice Guazuma as this can also be used as a medicine (digestive ailments). He has cut the NB21 twice this year already, the first time one month after planting, at the end of July and the second time at the end of August. He plans to cut for the third time very soon. He has planted Dinanath on the bari below the experimental plot and also likes it as a fodder. This has been cut once this year and fed to all animals, including goats. He says that Guazuma provides a similar fodder to Badahar and that this is also a preferred fodder.

Gauthale: Household no. 2 Khrisna Bahadur Magar

Diagram of planting pattern, 20m length.



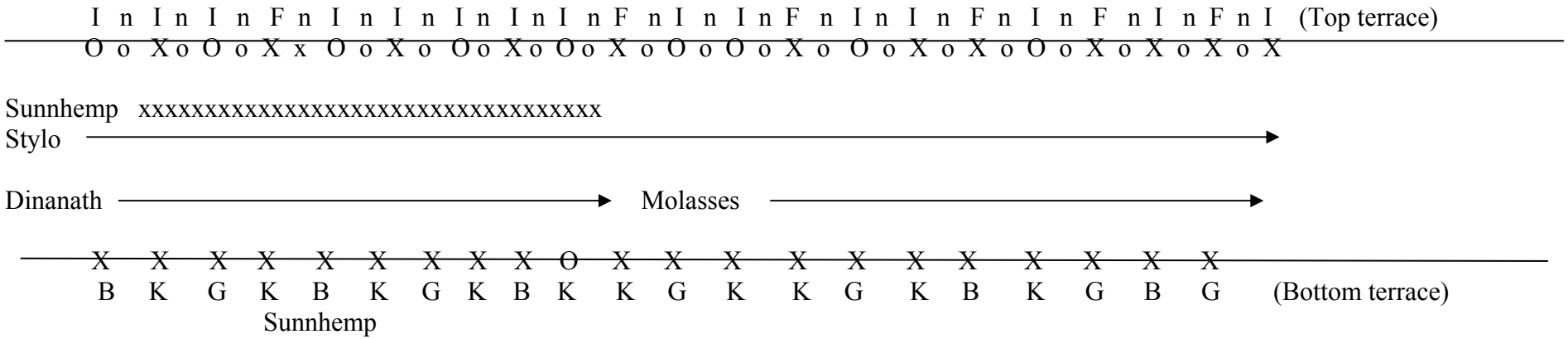
Key:		**Condition**
X	tree or shrub seedling	Very weedy and overgrown
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Excellent growth, planted at 1m spacing with Flemengia direct sown inbetween
n	NB21 Pennisetum sp.	Good establishment, has been cut recently
F	*Flemengia congesta*	Very difficult to see due to weed growth, few established
K	*Morus alba* (Kimbu)	Ok condition
B	*Artocarpus lakoocha* (Badahar)	Good growth
G	*Guazuma ulmifolia* (Guazuma)	Excellent growth
Stylo	*Stylosanthes guianensis*	No visible germination (was it planted?)
Molasses	*Melinis minutiflora*	Good germination
D	*Pennisetum pedicillatum (*Dinanath)	Good germination

His first choice of species is Ipil from his previous experience. It is important that it is a fodder liked by goats as well as cows and buffalo. He is able to cut it three times in a year, during the rainy season. He doesn't cut it during the winter season (November to January) as this sets back its growth once the rains come. His second choice is Molasses, because of the frequency with which it can be cut in the rainy season (every 15 days). He doesn't like Kimbu because of the disturbance he hears it can cause to the lower bari terrace (interfering with ploughing). He has cut very small amounts of NB21 and Dinanath and fed to cows and buffalo.

Gauthale: **Household no. 3** **Chhabi Bahadur Magar**

W **S**

Diagram of planting pattern, 20m length.

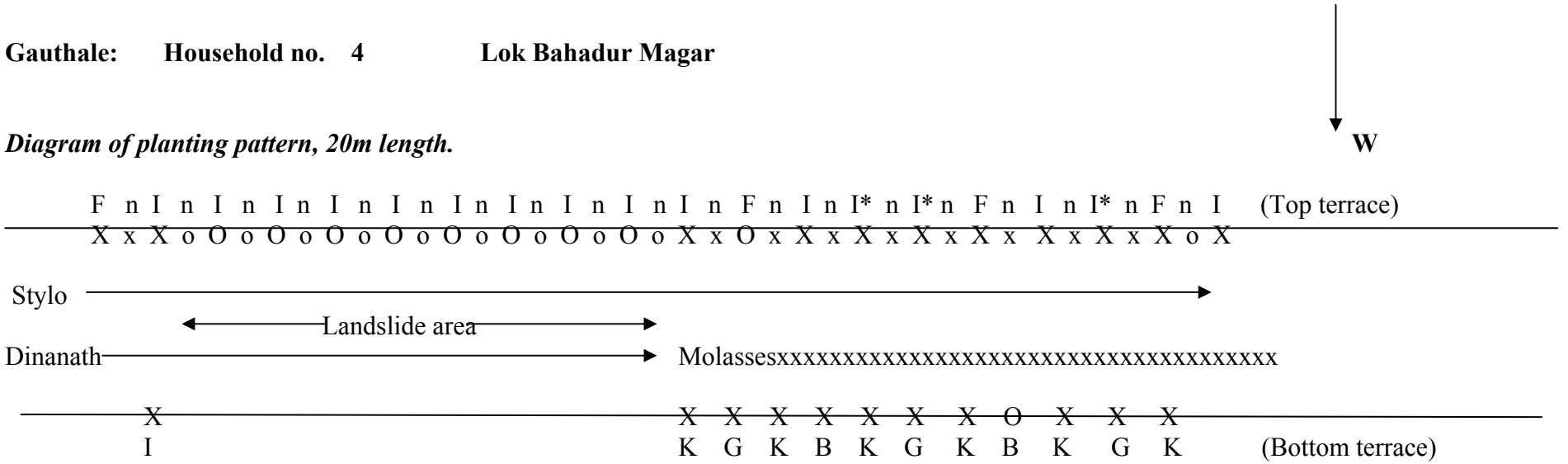


Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	For two weeks after planting out the plot there was no rain and this resulted in high mortality of both
n	NB21 Pennisetum sp.	Ipil and NB21 slips (all these except one have not survived).
F	*Flemengia congesta*	Good growth
K	*Morus alba* (Kimbu)	OK growth, but leaves very yellow
B	*Artocarpus lakoocha* (Badahar)	Good growth and condition
G	*Guazuma ulmifolia* (Guazuma)	Good growth and condition
Stylo	*Stylosanthes guianensis*	No visible germination
Molasses	*Melinis minutiflora*	No visible germination
D	*Pennisetum pedicillatum (*Dinanath)	No visible germination

Unable to discuss with farmer

Gauthale: Household no. 4 Lok Bahadur Magar

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	Very weedy with pumpkins growing over both ends of terrace, smothering seedlings
O	missing tree or shrub seedling	Landslide has taken out approximately half the plot
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good growth
I*	Last year's *Leucaena diversifolia* K-156	Excellent growth, most 2-2.5m in height, have not been cut yet.
n	NB21 Pennisetum sp.	Good growth
F	*Flemengia congesta*	Few have germinated and survived
K	*Morus alba* (Kimbu)	Good growth, rather yellow leaves
B	*Artocarpus lakoocha* (Badahar)	Good growth and condition
G	*Guazuma ulmifolia* (Guazuma)	Good growth and condition
Stylo	*Stylosanthes guianensis*	No visible germination, but too overgrown to see clearly
Molasses	*Melinis minutiflora*	Some germination, small growth (confirm position on map)
D	*Pennisetum pedicillatum (*Dinanath)	Very good growth

Unable to talk with farmer

Gauthale: Household no. 5 Kul Bahadur Magar

Diagram of planting pattern, 20m length.

S

I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I (Top terrace)

X o O o X x O o X x X o X o O o X o X x X o X o X x O x X x X o X o O x X x O x X

Stylo xxxxxxxxxxxxxxxxxx

Dinanathxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

X X X X X X O X X X X O X X X X X X X X X

B K B G K B K K B K G K B K B K G K B K (Bottom terrace)

← Molasses →

Key:		**Condition**
X	tree or shrub seedling	Not weeded and plot consequently not doing very well
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Small and swamped by weeds
n	NB21 Pennisetum sp.	Excellent growth, about 2m tall at present, requires cutting
F	*Flemengia congesta*	Direct seeded, few appear to have germinated, still very small
K	*Morus alba* (Kimbu)	Poor growth and yellow leaves
B	*Artocarpus lakoocha* (Badahar)	Poor growth
G	*Guazuma ulmifolia* (Guazuma)	Poor growth
Stylo	*Stylosanthes guianensis*	Small area germinated in centre of terrace
Molasses	*Melinis minutiflora*	Small area established at bottom of plot where seeds washed out to
D	*Pennisetum pedicillatum (*Dinanath)	Good growth and establishment

Unable to talk with farmer

Gauthale: Household no. 6 Bhim Bahadur Magar

Diagram of planting pattern, 20m length.

N

F n I n I n I n F n I n I n F n I n F n I n I n I n F n I n F n I* n F n I n I n I* n I*n I (Top terrace)
O x O o X o X o O o O o X o O o X x O o X x X x X o O o X o O o X o O x O x X x X x X x O
I* I* F

Stylo

Dinanathxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx Molasses

Kh Kh Kh Kut
X X X X X O X X X X X X X X X X X X O X X X X
G B K G K B K G K B K G K B K G K B K G K B (Bottom terrace)

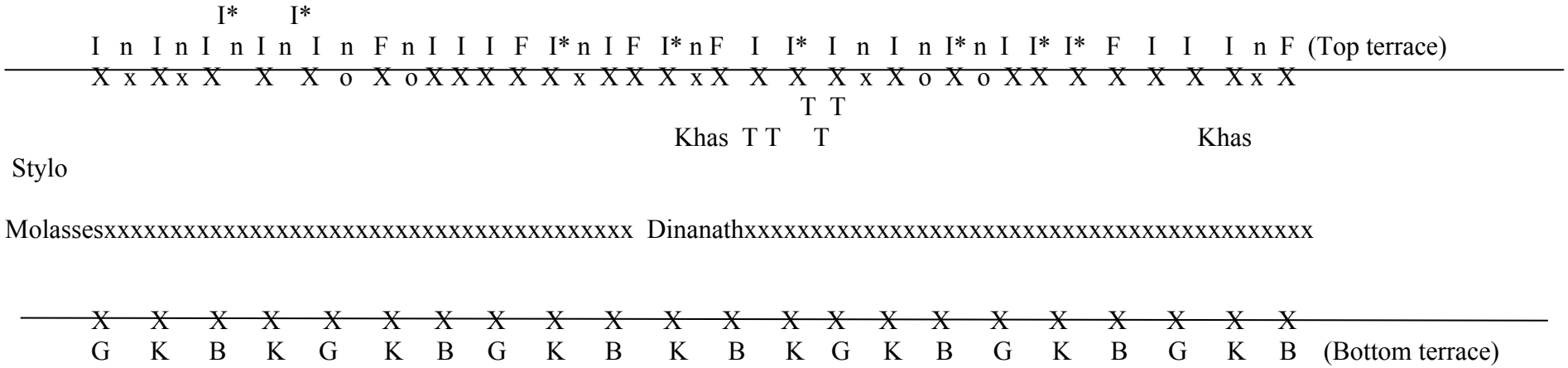
Key:		**Condition**
X	tree or shrub seedling	Well weeded
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Excellent growth, 0.5-1m in height
I*	Last year's *Leucaena diversifolia* K-156	Excellent growth, most 2-2.5m in height, have not been cut yet.
n	NB21 Pennisetum sp.	Good growth
F	*Flemengia congesta*	Direct seeded, few germinated and surviving
K	*Morus alba* (Kimbu)	Good growth and leaves green
B	*Artocarpus lakoocha* (Badahar)	Good growth
G	*Guazuma ulmifolia* (Guazuma)	Excellent growth
Stylo	*Stylosanthes guianensis*	No visible germination
Molasses	*Melinis minutiflora*	No visible germination
D	*Pennisetum pedicillatum (*Dinanath)	No visible germination
Kh	*Ficus semicordata var. semicordata* (Khanyu) tree already established on the terrace	
Kut	*Litsea monopetala* (Kutmiro) tree already established on the terrace	

Unable to talk with farmer

Gauthale: **Household no. 7** **Yam Bahadur Magar**

S **W**

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	Not weeded
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	OK but small growth
I*	Last year's *Leucaena diversifolia* K-156	Excellent growth, most 2-2.5m in height, have not been cut yet.
n	NB21 Pennisetum sp.	Only few surviving, growth good, not cut yet
F	*Flemengia congesta*	Some Flemengia germinated, but very small still
K	*Morus alba* (Kimbu)	Good growth, but yellowish leaves
B	*Artocarpus lakoocha* (Badahar)	Growth OK
G	*Guazuma ulmifolia* (Guazuma)	Growth good, height 0.5-1m
Stylo	*Stylosanthes guianensis*	No visible germination
Molasses	*Melinis minutiflora*	Good germination, covering half the plot
D	*Pennisetum pedicillatum (*Dinanath)	Good germination, covering half the plot
T	*Bauhinia purpurea* (Tanaki) tree already growing on the terrace	
Khas	*Ficus hinpida* (Khasreto) tree already growing on the terrace	

Gauthale: Household no. 8 Lal Bahadur Magar

Diagram of planting pattern, 20m length.

SW

I n I n F n I n F n F n I n I n F n I n F n I n F n I n F n I n F n I n I (Top terrace)

X x X x X x X x O x X x X x X x X x X x X x X x O o X x X x X x O x X x X

n n n n n n n

Stylo

Molassesxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx Dinanathxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

n

X X X X X X X X X X X X X X X O O O O

G K B K G K B K G K B K G K B K G K B

(Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Very weedy
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good growth
n	NB21 Pennisetum sp.	Good survival and growth
F	*Flemengia congesta*	Quite a few small seedlings of Flemengia have germinated and survived from direct seeding (?)
K	*Morus alba* (Kimbu)	Good growth
B	*Artocarpus lakoocha* (Badahar)	OK growth
G	*Guazuma ulmifolia* (Guazuma)	Good growth
Stylo	*Stylosanthes guianensis*	No visible germination
Molasses	*Melinis minutiflora*	Poor germination, sporadic along terrace
D	*Pennisetum pedicillatum (*Dinanath)	Only a few clumps of Dinanath have grown

Gauthale: Household no. 9 Khum Bahadur Magar

Diagram of planting pattern, 20m length.

SE

I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I (Top terrace)

X x O x X x O x X x O x X x O x X x O x X x O x X x O x X x O x X x O x X

Dubdube

Stylo xxxxxxx xxxxxxxxxx

Molassesxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Sunnhempxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx Dinanathxxxx

X X X X X X X X X X X X X X X X X X X X X X X

G K B K B G K B G K B K K B K G K B K G K (Bottom terrace)

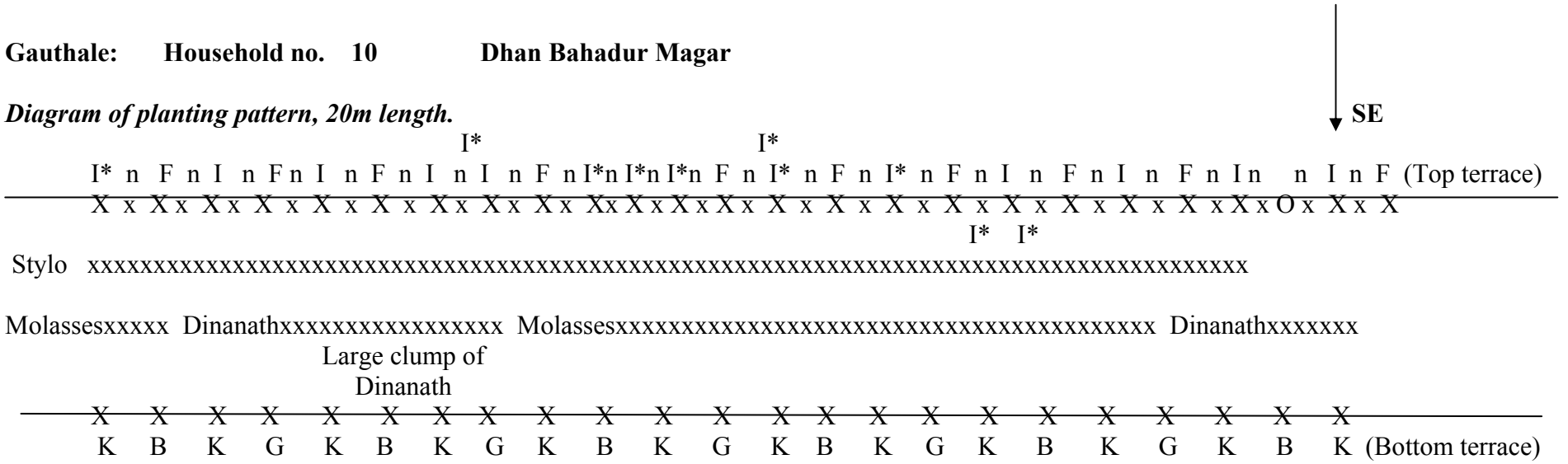
Key:		**Condition**
X	tree or shrub seedling	Very weedy, not been weeded since planting
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	
n	NB21 Pennisetum sp.	Good growth, survived as planted later, not hit by drought period
F	*Flemengia congesta*	Non of the Flemengia has germinated/ survived
K	*Morus alba* (Kimbu)	Established, but leaves very yellow
B	*Artocarpus lakoocha* (Badahar)	Ok growth
G	*Guazuma ulmifolia* (Guazuma)	Good growth
Stylo	*Stylosanthes guianensis*	Only small patches have germinated, but best growth in village, approx. 1ft height
Molasses	*Melinis minutiflora*	Good growth, especially at the centre of the plot
D	*Pennisetum pedicillatum (*Dinanath)	Very small area established
Dabdabe	*Garuga pinnata* (Dabdabe) large tree already established at northern end of plot casting considerable shade in that area.	

Kum Bdr ranks NB21 first among the grasses and Ipil first among the fodder trees. This on the criteria of quick growth, and nutritious and palatable fodder. Ipil has the added advantage of providing some fuel wood as well.

Established clumps of NB21 are cut five times in the year, during the rainy season between mid April to mid October. Ipil he cuts only twice as he wants to get good quality poles for animal housing. He cuts in April/May and September/October, avoiding cutting during the dry season as this slows the trees growth.

Gauthale: Household no. 10 Dhan Bahadur Magar

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Very good growth. Planted later so not effected by earlier poor rains
I*	Last year's *Leucaena diversifolia* K-156	Excellent growth, most 2-2.5m in height, have not been cut yet.
n	NB21 Pennisetum sp.	Excellent growth. Planted later so not effected by earlier poor rains
F	*Flemengia congesta*	Direct seeded, very small still, where germinated
K	*Morus alba* (Kimbu)	Good growth, but very yellow leaves
B	*Artocarpus lakoocha* (Badahar)	Ok growth
G	*Guazuma ulmifolia* (Guazuma)	Good growth
Stylo	*Stylosanthes guianensis*	Sporadic germination, only few seedlings but showing good growth, 6-8 inches high
Molasses	*Melinis minutiflora*	Good germination at centre of plot
D	*Pennisetum pedicillatum (*Dinanath)	Very good growth, but much of seed washed down terrace face and onto terrace below

Dhan Bdr ranks Dinanath first of the species as it grows very fast and can be cut once a month during the rainy season. It gives good quality fodder that satisfies animals for longer. It is very much liked by all animals, though he feeds only to buffalo and oxen, and cows if they are milking. Second choice is NB21 using similar criteria. It is available at the same time as Dinanath. 3rd choice Ipil on same criteria. He cuts twice a year, but not at time when most foliage is available (April/May). He saves it for Dec/Jan and especially June/July, when the household is very busy with other work and doesn't have time to go and collect fodder. 4th choice Kimbu as it is easy to propagate and grows quickly.

Tawari: Household no. 1 Ms Kabita Tamang

Diagram of planting pattern, 20m length. ↓ **NW**

F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I (Top terrace)

O x X x X x O x O x X x O x X x X x X x X x X x X x X x X x X x X x X x X x X x X x X

I*

Stylo xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Molasses xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

X X X X X X X X X X O O X X X X X X X X X X X X

K K K K K K K K K K K K K K K K K K K K K K K K (Bottom terrace)

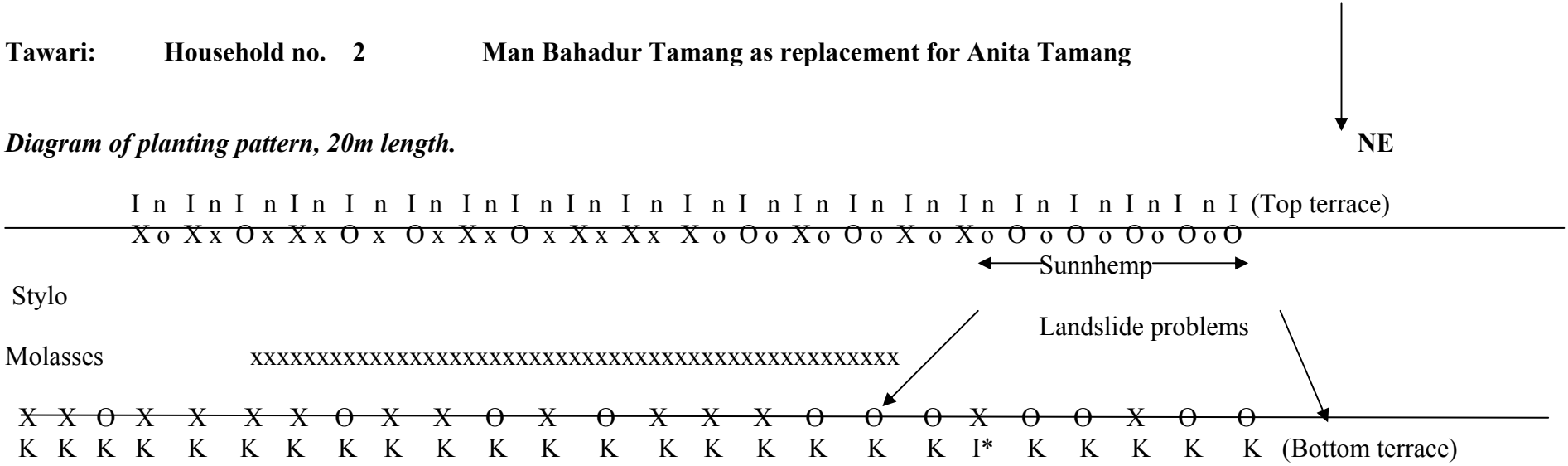
G G G G

Key:		**Condition**
X	tree or shrub seedling	Well weeded
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Some seedlings doing very well at a height of 0.5 m, others still very small
I*	Last year's planting of *Leucaena diversifolia* K-156	
n	NB21 Pennisetum sp.	Established, but small, 0.25-0.5m height
F	*Flemengia congesta*	Good growth
K	*Morus alba* (Kimbu)	Established, but still small
Stylo	*Stylosanthes guianensis*	Sporadic germination, very small
Molasses	*Melinis minutiflora*	Very good germination, luscious growth, approximately 0.3m tall
G	*Ficus clavata* (Gedulo) trees already established on the terrace	

Kabita's first choice of species is NB21 and Molasses. She says that they both grow fast, she had cut them both once, in August and fed the small amount of fodder available to the milking buffalo. 2nd choice Flemengia. She says that she likes them all and likes to grow a mixture of species.

Tawari: Household no. 2 Man Bahadur Tamang as replacement for Anita Tamang

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	All Ipil on upper terrace, many missing
n	NB21 Pennisetum sp.	Only some have taken
F	*Flemengia congesta*	None germinated from direct seeding
K	*Morus alba* (Kimbu)	In poor condition
Stylo	*Stylosanthes guianensis*	No visible germination (was it sown?)
Molasses	*Melinis minutiflora*	Fair germination, but still very small

Anita Tamang has left the village to get married. Man Bdr, the NGO representative has started a trial plot to make use of the seedlings that Anita raised and that her family were not interested to use. It is also for his own interest.

Tawari: Household no. 3 Ms Sunita Tamang

Diagram of planting pattern, 20m length. **W**

I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n (Top terrace)
X x O x X x X x X x X o X x X o X o X o X x X o X o X x X o X o X o X x X x X x O x

Stylo xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Molasses xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

X O O X X X X X X X X X X X X X X X X O X
K K K K K K K K K K K K K K K K K K K K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Very weedy
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Very poor growth and yellowing leaves
n	NB21 Pennisetum sp.	Some established, OK growth
F	*Flemengia congesta*	Few seedlings showing through from direct sowing, but very small 4-5 centimetres inches tall only
K	*Morus alba* (Kimbu)	Not looking happy, yellowish leaves and poor growth
Stylo	*Stylosanthes guianensis*	No visible germination
Molasses	*Melinis minutiflora*	Good germination, but still small 10-15 centimetres tall

No interview with farmer

Tawari: Household no. 4 Ms Rupadevi Bhujel

Diagram of planting pattern, 20m length. **NE**

I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I (Top terrace)

X x X x X x X x X x X x Xx X oXx X x X x X x X x X x X x X x X x X o X x X x X

Stylo xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Molasses xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

XXMolassesXXX

X X X O X X X X X X X X X X X X X X X X X X

K K K K K K K K K K K K K K K K K K K K K K (Bottom terrace)

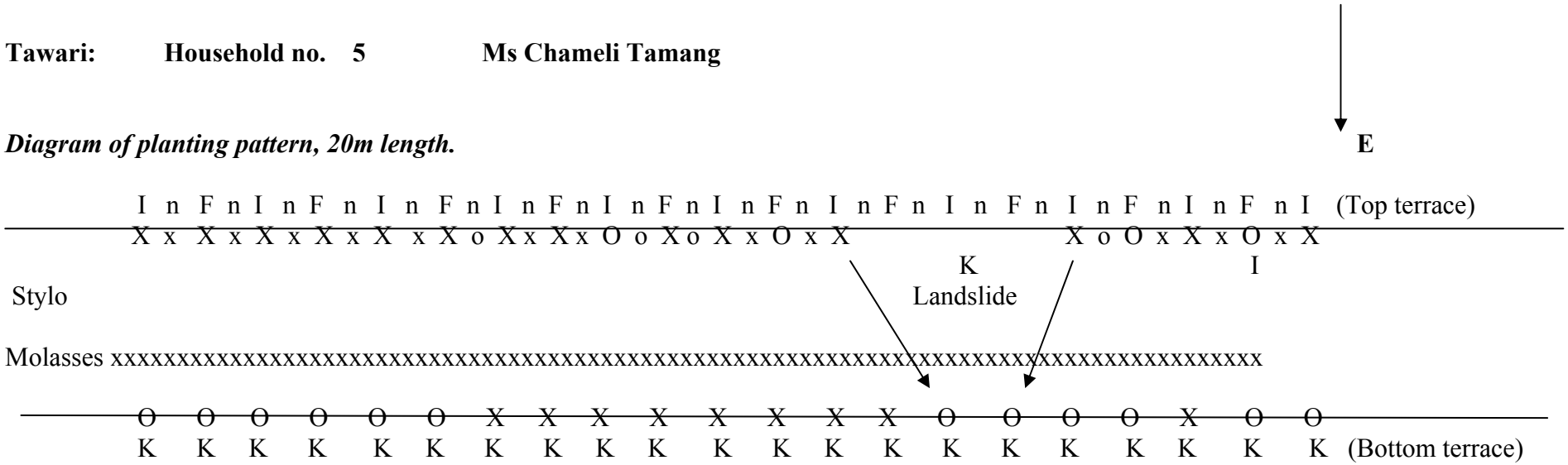
Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Small, poor growth
n	NB21 Pennisetum sp.	Very good growth. Larger clumps have been cut three times, smaller clumps not yet
F	*Flemengia congesta*	Good growth
K	*Morus alba* (Kimbu)	Small, but OK
Stylo	*Stylosanthes guianensis*	Germination only just showing, still very small seedlings, sporadic germination
Molasses	*Melinis minutiflora*	Excellent growth, especially of lower clump sown one month earlier than rest of plot. Cut once.

1st choice Molasses as grows fast and can cut quickly. She has lots of it and so it provides a considerable amount of fodder. 2nd choice NB21 which she considers has the same feed value as the Molasses. Doesn't grow quite so quickly at this altitude on her land. 3rd choice Flemengia as produces more fodder than either Ipil or Kimbu. She has not cut the large clump of Molasses planted one month earlier as she wants to collect the seed for further sowing.

Rupadevi has planted several terraces of Sunnhemp on the rest of her land. She likes it because it grows quickly and all the livestock likeit, cows, buffalo and goats.

Tawari: Household no. 5 Ms Chameli Tamang

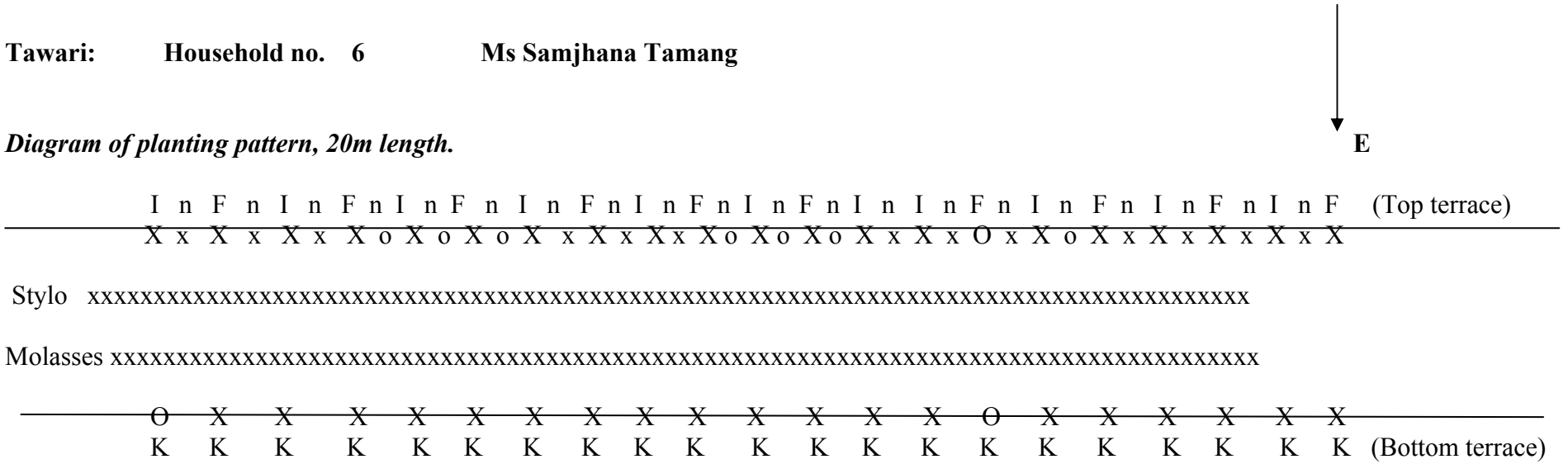
Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	Poor soil fertilility
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Very poor growth and foliage yellowing
n	NB21 Pennisetum sp.	Well established, but growth poor, small
F	*Flemengia congesta*	Southern end of plot growth good, Northern end high mortality
K	*Morus alba* (Kimbu)	Very poor growth, having difficulty establishing, high mortality
Stylo	*Stylosanthes guianensis*	No visible germination
Molasses	*Melinis minutiflora*	Germinating sporadically, still very small

Chameli thinks that the generally poor growth of all species is due to the poor, infertile soil. Her plantings of Ipil last year have done much better on another site. She has not cut any of the species yet because there is not yet enough growth.

Her preferred species is Molasses because of its rapid growth and recovery after cutting so that several cuts can be taken in one year. 2nd choice is Flemengia as she considers it faster growing than Ipil and it can be cut more quickly after planting.



Tawari: **Household no. 6** **Ms Samjhana Tamang**

Diagram of planting pattern, 20m length.

E

I n F n I n F n I n F n I n F n I n F n I n F n I n I n F n I n F n I n F n I n F (Top terrace)

X x X x X x X o X o X o X x X x X x X o X o X o X x X x O x X o X x X x X x X x X

Stylo xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Molasses xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

O X X X X X X X X X X X X X O X X X X X X

K K K K K K K K K K K K K K K K K K K K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Poor growth and foliage yellowish
n	NB21 Pennisetum sp.	Good growth, cut once so far
F	*Flemengia congesta*	Good growth
K	*Morus alba* (Kimbu)	Good condition and fair growth
Stylo	*Stylosanthes guianensis*	Sporadic germination and still very small at 2-5 cm height
Molasses	*Melinis minutiflora*	Good germination, but still small at 8-12cm height

Samjhana's ranking of species puts Flemengia 1st because of its large leaf and fodder potential. Sunnhemp is her second choice because it is easy to propagate, establishes well and grows quickly. 3rd choice is Molasses because of its potential good growth in the area (she has seen good growth on others land). 4th choice Ipil because it can grow well.

Tawari: **Household no. 7** **Ms Ranjana Magar**

↓ **SE**

Diagram of planting pattern, 20m length.

I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I (Top terrace)

X x O x X x O x X x O x X o O x O x O x X o O o X o O x X o O O X o O o X o O o X

Stylo xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Molasses xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

X X X X X X X O O O X X X X X X X X X X X

K K K K K K K K K K K K K K K K K K K K K (Bottom terrace)

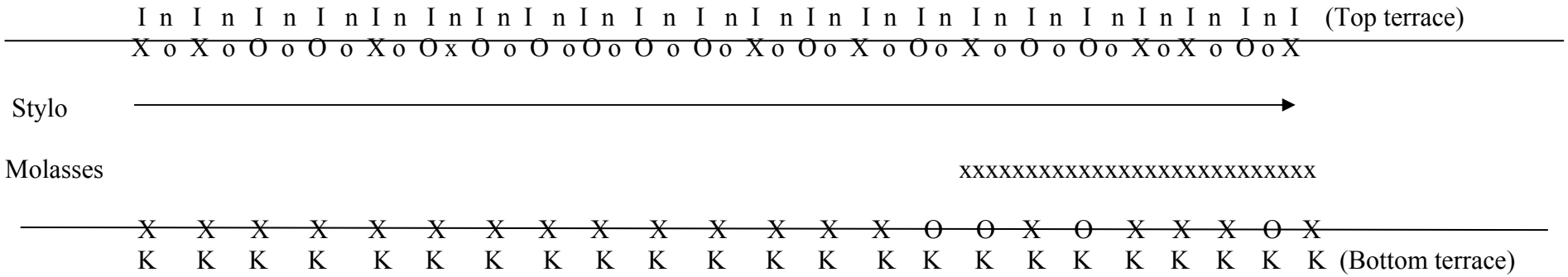
Key:		**Condition**
X	tree or shrub seedling	Terrace is covered in pumpkin and so seedlings are choked
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Seedlings small and foliage yellowish
n	NB21 Pennisetum sp.	Good growth, but only one slip in each pit, so not bushy growth
F	*Flemengia congesta*	No germination
K	*Morus alba* (Kimbu)	Good growth but foliage yellowish
Stylo	*Stylosanthes guianensis*	Stylo has not germinated as yet
Molasses	*Melinis minutiflora*	Good germination and growing

Ranjana's first choice of species is Kimbu because it is fast growing and has a large leaf. 2nd choice is Molasses and Dinanath (joint selection as she likes them both equally). She cuts the grasses twice a year and uses them at the time of year when she is most busy and does not have time to go and collect. She feeds them to the cows and buffaloes.

Tawari: **Household no. 8** **Ms Laxmi Magar**

Diagram of planting pattern, 20m length.

SE

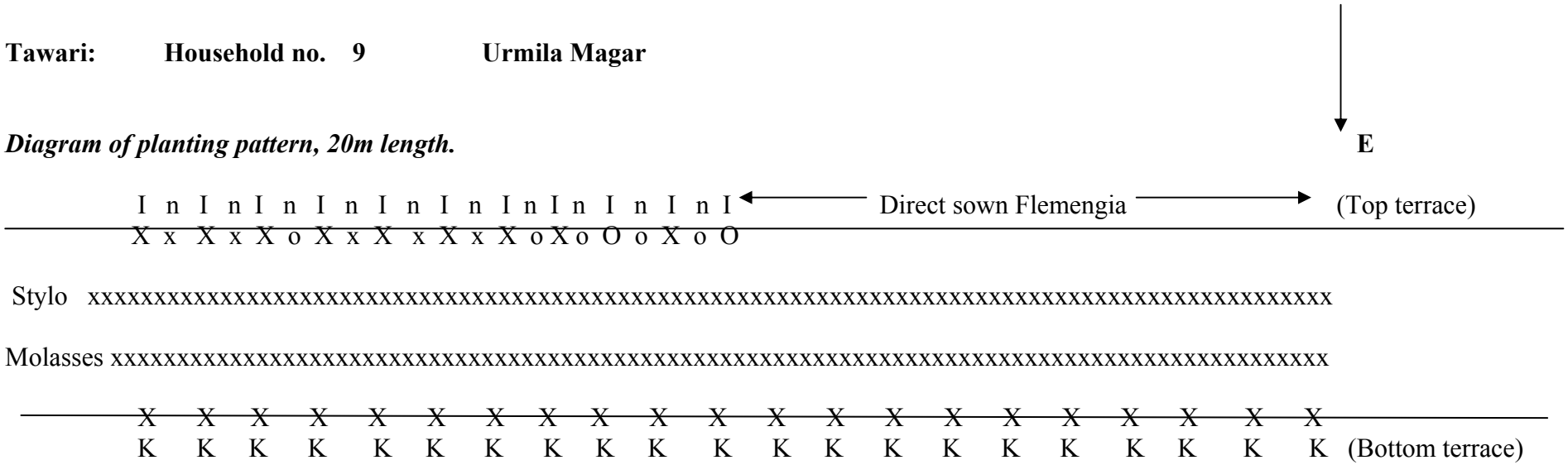


Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	
n	NB21 Pennisetum sp.	
F	*Flemengia congesta*	Direct sown and none visible as yet
K	*Morus alba* (Kimbu)	Excellent growth and condition
Stylo	*Stylosanthes guianensis*	Grasses all seem to have been washed out by heavy rains after planting. No Stylo visible
Molasses	*Melinis minutiflora*	Seed washed out by heavy rains. Some germinated at North east end of plot

Laxmi can't say yet which is the best of the species as she has still to see how they fare over the winter and to try them as fodders.

Tawari: Household no. 9 Urmila Magar

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	Very steep-side terrace. Surprising that grass seed has taken and not washed out
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Only half of Ipil seedlings have survived, those at the southern end of the plot
n	NB21 Pennisetum sp.	Only a few surviving
F	*Flemengia congesta*	Direct sowing shows no successful germination at all
K	*Morus alba* (Kimbu)	Excellent growth
Stylo	*Stylosanthes guianensis*	Good germination, seedlings at height of 8-10 cm
Molasses	*Melinis minutiflora*	Good germination, seedlings at height of 15-20 cm

1st choice of species Molasses because it establishes and grows fast, it is easy to cultivate and it is liked by cattle and buffalo. 2nd choice Kimbu because she knows that once it is mature it will give more fodder than the other species. 3rd choice Dinanath because it is easy to propagate and when she fed to cattle and buffalo they found it very palatable.

Tawari: Household no. 10 Ms Rumila Magar

Diagram of planting pattern, 20m length. **SE**

I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I n F n I (Top terrace)

X o X o O o O o X o O x O o O o O x O x O x O x X o O o X o O o X o O o O o O o O

Stylo xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Molasses xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

X X X X X X X X X X X X X X X X X X X X O

K K K K K K K K K K K K K K K K K K K K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	
n	NB21 Pennisetum sp.	Where present, growth very good
F	*Flemengia congesta*	Only one seedling germinated and survived from direct seeding
K	*Morus alba* (Kimbu)	Good growth
Stylo	*Stylosanthes guianensis*	Poor germination so far, concentrated in one area of the plot
Molasses	*Melinis minutiflora*	Good germination and growth good

Ist choice Molasses, second choice Dinanath and third choice Kimbu. This is just on the criteria of their growth so far as she does not yet have experience with them as fodders.

High mortality rate probably due to the site having to be changed at the last minute and Rumila having already planted beans at the edge of the upper terrace. The beans probably interfered with seedling growth. Poor germination of the Flemengia.

Chankhubesi: Household no. 1 Krishna Kumari Parajuli's household did not want to plant any fodder on their small amount of land because of danger of shading effect and reducing crop yields. Another farmer**, Menuka Aryal** has joined the experiment**.**

Diagram of planting pattern, 20m length. **E**

I n I n I n I n I n I n I n I n I n I n I n O n I n I n I n I n I n (Top terrace)
X o X o X o X o X o X x X x X o X o X o X o X x X x X x X o X x X x X x

Molasses Velvet bean

X X O O X X X X X X X X X X X X X X O X
K K T K K B K K T K K B K K T K K B K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Very well weeded (by labourers who didn't know about grasses, all cleared)
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good growth, some 1m high already
n	NB21 Pennisetum sp.	Good establishment and growth, been cut once already when greater than 1m in height
K	*Morus alba* (Kimbu)	Good growth
T	*Bauhinia purpurea* (Tanki)	Ok condition
B	*Artocarpus lakoocha* (Badahar)	Good growth
Velvet bean	*Stizolobium pruriens*	Removed during weeding of the terrace by labourers
Molasses	*Melinis minutiflora*	Removed during weeding of the terrace by labourers

Menuka's first choice of species is Molasses (even though none surviving on her plot), as she has seen it looking very good on others plots. It can be cut in the same year it is planted and several cuts a year can be made once it is established. 2nd choice is NB21 because it produces a lot of fodder. She has cut her plot slips once, in July when advised by Sushmita that they were getting over mature. She fed the cut grass to cows and buffalo, not goats. She places Tanki as third choice and Ipil as 4th. She has no experience with Badahar.

Chankhubesi: **Household no. 2** **Subhadra Koirala**

Diagram of planting pattern, 20m length.

S

12 out of 21 Ipil remaining, check position on terrace. Also check how many NB21 remaining?

I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I (Top terrace)

X x O x O x X x O x O x O x X x O x O x X x O x X x X x X x O x X x X x X x X x X

Molasses xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx Velvet bean

X X X X O X X X X X X X O X X X O X X X X

T K K B K K T K K B K K T K K B K K T K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Well weeded terrace face
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Condition OK, but small, little growth
n	NB21 Pennisetum sp.	Very good growth
K	*Morus alba* (Kimbu)	Very good growth (seedlings of all trees from her own nursery, one of best in the village)
T	*Bauhinia purpurea* (Tanki)	Very good growth
B	*Artocarpus lakoocha* (Badahar)	Very good growth
Velvet bean	*Stizolobium pruriens*	Attacked by insects, now all dead (few remaining on last visit in August)
Molasses	*Melinis minutiflora*	Good growth, cut once in July to encourage further regrowth and increase yield. One handful only harvested, this was fed to all livestock.

Subhadra ranked Kimbu first of the species on trial because of its quick growth and the potential to cut it more than once a year, once it is established. 2nd choice Badahar as she knows this to be a good fodder from previous experience, however not as good initially as kimbu because have to wait 3-4 years before it begins to give fodder.

Chankhubesi: **Household no. 3** **Chetra Kumari Tamang**

Diagram of planting pattern, 20m length.
=>Need to check where NB21 is positioned

I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I (Top terrace)
X x O x X x X x X x O x X x O x X x X x X x X x X x O x X x X x O x O x X x O x O

Molasses xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx Velvet bean xxxxx xxxxxxxx xxxxx

O X X X X X O X O O X X X X X X
K T K K B K K T K K B K K T K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good growth
n	NB21 Pennisetum sp.	Good growth, some slips missing (which ones?)
K	*Morus alba* (Kimbu)	Good growth
T	*Bauhinia purpurea* (Tanki)	Good growth
B	*Artocarpus lakoocha* (Badahar)	Good growth
Velvet bean	*Stizolobium pruriens*	Only sporadic germination
Molasses	*Melinis minutiflora*	Good germination and growth

NB21 is Chetra's first choice among the species because it becomes productive very quickly and produces a lot of fodder. Her second choice is Badahar because of previous experience with this local species. It grows into a large tree that produces lots of fodder that all livestock find palatable. Her Ipil planted last year is doing very well, but is becoming too tall for the strength of the trunk and is vulnerable to being blown over in the wind. She was advised to cut it.

Chankhubesi: Household no. 4 Kaili Tamang
Nayagaon

Diagram of planting pattern, 20m length. **N**

Was lower row planting of kimbu etc. ever planted at western end? Do O's represent deaths, or no planting?

I n I n I n I n I n I n I* n I* n I* n I Area not planted ⟶ (Top terrace)
O o X o X o X o X o X o X o X o X o X

Molasses xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx Velvet bean xxxx xxxxxxx

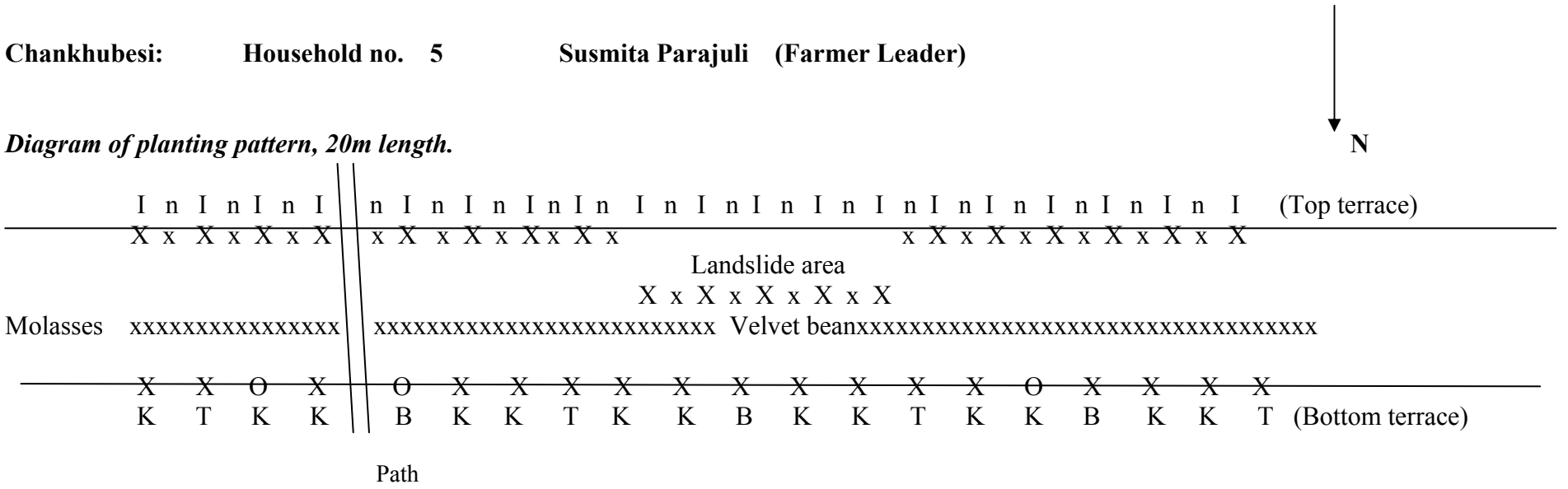
O O X X X O X O X X X O O O O O O O O O
K K T K K B K K T K K B K K T K K B K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Too little space for full layout. Kimbu at western end swamped by pumpkin, nothing visible
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good growth. Extra Ipil never received
I*	last years planting of Leudaena diversifolia K-156	Need to be cut before blown over as very spindly
n	NB21 Pennisetum sp.	Never supplied by NGO rep?
K	*Morus alba* (Kimbu)	Surviving seedlings look in good condition
T	*Bauhinia purpurea* (Tanki)	Surviving seedlings look in good condition
B	*Artocarpus lakoocha* (Badahar)	None surviving
Velvet bean	*Stizolobium pruriens*	Only a little successful germination
Molasses	*Melinis minutiflora*	Good growth, has been cut once

Kaili identifies Flemengia that was planted last year as her preferred species (unusually as group decision was not to include it in the trials as not generally preferred). She has been able to cut her seedlings from last year several times and livestock liked the fodder. 2nd choice Molasses as again this species has managed to produce some fodder very quickly (this year's plantings).

Chankhubesi: Household no. 5 Susmita Parajuli (Farmer Leader)

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	landslide has destroyed the terrace face in the middle of the plot
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good condition, but small
n	NB21 Pennisetum sp.	Very good growth
K	*Morus alba* (Kimbu)	Good condition
T	*Bauhinia purpurea* (Tanki)	Good condition
B	*Artocarpus lakoocha* (Badahar)	OK condition
Velvet bean	*Stizolobium pruriens*	Sporadic germination
Molasses	*Melinis minutiflora*	good germination and growth

Susmita's first choice of species is NB21 as it grows fast and therefore produces more and can be cut more often than other species. She has already cut the plot slips twice and fed to milking animals. 2nd choice is Molasses. Not as good as NB21 as it grows more slowly and is less well liked by animals. (Experience suggests that animals take time to get accustomed to Molasses, and then it is liked equally well).
In the rainy season she feeds the new grasses with other cut grasses. In the winter she feeds in a mixture with rice straw.

Chankhubesi: Household no. 6 Sharada Parajuli

Diagram of planting pattern, 20m length. **N**

I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I (Top terrace)
X x X x O x X x X x X o X x X x X x X x O x X x O o X x O x O o O x X x X

Velvet bean sown, but landslide took seeds Molassesxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

O O X X X X O X X O X X X X X X O X O O
K K T K K B K K T K K B K K T K K B K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Plot rather weedy
O	missing tree or shrub seedling	Landslide to eastern end of plot destroyed Velvet bean and two Kimbu seedlings
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good condition, small
n	NB21 Pennisetum sp.	Well established, good growth
K	*Morus alba* (Kimbu)	Good growth
T	*Bauhinia purpurea* (Tanki)	OK condition
B	*Artocarpus lakoocha* (Badahar)	OK condition
Velvet bean	*Stizolobium pruriens*	Taken out by landslide
Molasses	*Melinis minutiflora*	Good germination and growth

Sharada's 1st choice among the species is for NB21 as she has already cut once (produced fodder quickly) and is liked by animals. Second choice is Molasses, because its growth also looks good at this stage. She has not yet cut the Molasses. She considers that it is too soon to be able to rank the other species.

Chankhubesi: Household no. 8 Parvati Ghimire
Nayabasti

Diagram of planting pattern, 20m length.

NW

I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I (Top terrace)
O x O x O x O x O x O x X x X x X x X x O x O x O x X x O x O x X x X x X x O

Molasses xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx Velvet bean xx xx xx x xx xx xx xx

O O O O O X X O X O X O X O X X O O O X X
T K K B K K T K K B K K T K K B K K T K K (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Plot very weedy
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Good condition, but small
n	NB21 Pennisetum sp.	Good establishment, very good survival rate, not very big yet
K	*Morus alba* (Kimbu)	Many mortalities, but those remaining in good condition
T	*Bauhinia purpurea* (Tanki)	Those remaining in good condition
B	*Artocarpus lakoocha* (Badahar)	Those remaining in good condition
Velvet bean	*Stizolobium pruriens*	Few large plants that have already formed seed pods. She plans to harvest with other fodder
Molasses	*Melinis minutiflora*	Good germination and growth

Parvati's preferred species is Molasses. She sowed some last year and has already cut one bhari (approximately 50 kg fresh weight) from this, which she fed mainly to cows and buffalo, a little to goats. She finds it a very good quality fodder, that grows quickly and can re-cut frequently. 2nd choice Dinanath which she also planted some of last year. 3rd choice Badahar which she has had experience with before.

Chankhubesi: Household no. 9 Chandra Kumari Lama
Nayagaon

Diagram of planting pattern, 20m length. **SE**

=>Were any NB21 planted? Not shown on field notes

I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I n I (Top terrace)
X x O x X x O x O x X x X x X x X x X x O x O x O x X xO x X x X x O x O x O x O

Molasses xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx Velvet beanxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

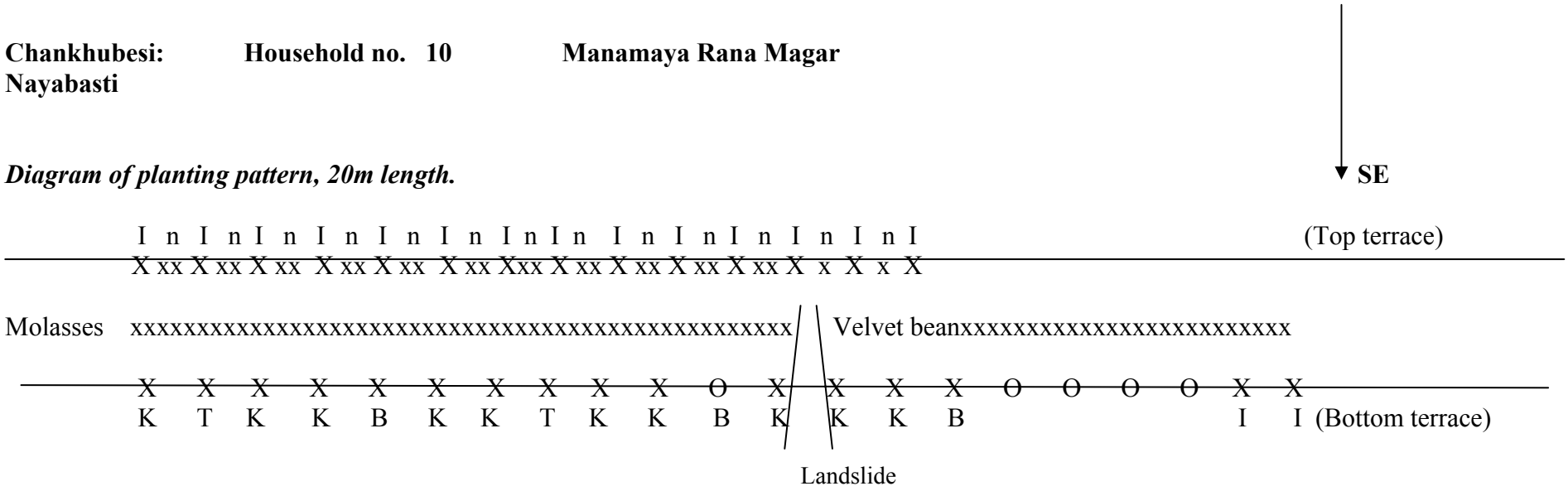
X X X X X X X X X O X O O X X X O O O X X
K K T K K B K K T K K B K K T K K B K K T (Bottom terrace)

Key:		**Condition**
X	tree or shrub seedling	Weedy and overgrown by pumpkins
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	Small, poor growth (were seedlings damaged?)
n	NB21 Pennisetum sp.	?
K	*Morus alba* (Kimbu)	Good growth and condition
T	*Bauhinia purpurea* (Tanki)	Good condition
B	*Artocarpus lakoocha* (Badahar)	good condition
Velvet bean	*Stizolobium pruriens*	Few mature plants
Molasses	*Melinis minutiflora*	Overgrown and suppressed by pumpkins

Chandra's first choice of species at this stage is Kimbu because so far it shows the best growth on the plot. She knows that it can be harvested soon after planting (compared to other trees) and produces a lot of fodder once mature. From previous planting last year she also likes Flemengia. She plans to plant Badahar next year (she has 100 seedlings her nursery at present). It is a good quality fodder tree and produces a lot of fodder once established.

Chankhubesi: Household no. 10 Manamaya Rana Magar
Nayabasti

Diagram of planting pattern, 20m length.



Key:		**Condition**
X	tree or shrub seedling	
O	missing tree or shrub seedling	
x	grass slip or seedlings	
o	missing grass slip, or seedling	
I	*Leucaena diversifolia* K-156	
n	NB21 Pennisetum sp.	Good growth
K	*Morus alba* (Kimbu)	Good growth
T	*Bauhinia purpurea* (Tanki)	OK growth
B	*Artocarpus lakoocha* (Badahar)	OK growth
Velvet bean	*Stizolobium pruriens*	Excellent growth
Molasses	*Melinis minutiflora*	Good growth

A shortage of Kimbu, Tanki and Badahar seedlings meant that the last 6 spaces at the north east end of the terrace were not filled.
Manamaya identifies Molasses as her most preferred species as it grows well and promises to produce plenty of fodder for minimal inputs. She has not yet cut. 2nd choice is velvet bean, which she has cut once already. 3rd choice is Kimbu as this also appears to be growing well. The other species she does not rate as they are too much hard work for little return.
She would like to grow more of Molasses, Gogan, Kainyo and Gerulo.

Appendix 2 Details of village visits 20-28th September 1999

Chankubesi

NGO support to village activities
Ram Sharan Karki has continued working as the NGO representative of the Nepal Welfare for the Blind Society, NAF's contact in the area. He has visited the research site regularly and given support to the three groups that have developed in Naya gaon, Naya basti and Chankubesi. At the time of this visit we were informed that the group in Naya basti had decided to closedown and had re-distributed their savings fund. The reason for closure of this group was cited as a general lack of interest on behalf of all members and a perceived lower level of support from NAF than was provided to the other two groups, which contain research group members.
The 10 households chosen for survey remain unaffected as six belong to the Chankubesi savings and agroforestry group and four to the Naya gaon group.

Agricultural activities in the village:
Harvesting of maize is on going in the village with about 50% completed. Households are busy with shelling and drying the harvested crop. The yield of maize this year has been average to good, a relief to farmers after the 50% reduction in yield experienced last year. Khet rice is looking good and should be beginning to ripen at this time. Farmers were concerned, however, that with the continued heavy rains, final yields would not be as good as promised at present. As well as reduced grain yields, rice straw (important crop residue animal feed) is particularly susceptible to reduced palatability if the crop lodges in wet conditions.
Vegetable cultivation is a major income earner in the area and tomatoes (not yet fruiting), cabbages (ready for harvest and at seedling stage), and cauliflower (seedling bed and young transplants) were the most visible vegetables being grown at the field scale.

Individual interview with leader farmer, Sushmita Parajuli
Changes in understanding and response to survey questions
At first the group wasn't clear why the data was being collected and the concept of quantifying their feed deficit was completely new to them. With success visits by the survey team and answering farmers' questions the objectives have now become much clearer. The training for farmer leaders and NGO representatives in October 1998 was also helpful in clarifying the concept of fodder deficit. The quantification of bharis in kilograms also gave farmers clearer guidelines for conversion of children's collections to standardised, adult bharis. Consequently, data collected during the first two surveys, March and May 1998 on feed collection and estimated deficits, was given on a different basis than later data. Questions relating to production objectives were understood from the outset.

Seasonal changes in feed offered to Oxen
Farmers feed more to working oxen. When they are not working, no concentrates are fed and they are grazed with some cut grasses and crop residues offered if available.
Main ploughing times (exact timing each year dependent on the rains) are:
April/ May for preparation of bari land for the maize planting (most heavy work).
July for preparation of khet for the first rice crop
August/September bari (light work)
November/ December for khet

Clarifying changes over time in livestock numbers and productivity in the area
Farmers agreed that for the last 18 years, or more, that there had been approximately the same number and breeds of livestock in the area. The first crossbred Jersey cows were introduced more than 18 years ago, but the number (and probably % improved, see below) has increased, so that all cows are now identified as crossbred. Availability of fodder has decreased as the number of households in the area has increased. 12-15 years ago there was still considerable grazing areas available, now very little. Marked fodder deficits were identified as beginning approximately 10 years ago.
There is a local veterinary centre that offers AI services with both 50% and 75% Jersey cross stocks. The farmers in the group said that they had been using this service for about 10-12 years and that they were now producing 2nd and 3rd generation progeny. There are no pure-breds in the village. The most improved stock requires approximately twice the amount of feed and less improved one and a half times the feed of local cows. Similar composition of feed is given to both.

Concentrate use
Three major ingredients of concentrate produced at the household level were identified:
Dhuto – rice bran
Pito – maize flour (whole ground maize)
Pina – mustard oil cake (residue after mustard oil extraction)
The exact composition of the concentrate varies according to the availability of the different ingredients, which varies between households and over the year. Dhuto tends to be available as a by-product of household consumption mainly at Desai and Tihar. Dhuto is cheaper than Pito, but little is produced at household level at other times of the year and so has to be bought. Pina is added when available in small quantities. Commonly a mixed concentrate will consist of Dhuto and Pito in quantity available/affordable to make 4 manna with 0.5 manna of Pina.
This mixture is fed to all milking animals, more when they are more productive. Goats are only fed maize flour and oxen commonly only rice bran.

Use of crops:
Crop thinnings
Only thinnings from the maize crop are used for animal feed in any quantity. The maize is thinned just once in this area, within a month of sowing. Farmers had difficulty estimating how much they collected from a ropani of land, but suggested half a bhari, 20kg. This is the equivalent of 400kg per hectare.
Growing crops
All farmers collect leaves from the growing maize crop in August, when they are preparing for millet transplanting. Maize tops are only cut by some farmers occasionally, when other cut grasses are not available, or if the household is short of labour.

General feed-back from group
Krishna K Parajuli, HH1 has only a little land and does not want to plant fodder trees because of fears of the negative effect of shade on crop yields. They consider that they have no room to plant trees. The leader farmer, Sushmita Parajuli has found another farmer who is interested to join the experiment, Myanuka Aryal. This household is from a higher wealth rank group…[cross-reference original rankings].
Generally farmers in the village are more interested in developing their vegetable production than in fodder resources. They are not keen on nursery establishment because of the time, work and water involved. They are, however, interested in species that they can sow, or plant

slips of directly, like the grasses. Some farmers had also successfully grown Ipil and *Flemengia congesta* from direct sown seed.
More interest was shown in the research plots because seedlings had been brought in from outside of the village (due to poor nursery survival rates) and these had been visited regularly by the researchers. Those members of the groups who are not involved in the research were asking why they had not received these additional seedlings too.

Farmers present at group meeting, 20th September 1999

Present:	Not present:
HH1 Krishna K Parajuli	HH7 Laxmi Thing
HH2 Subhadra Koirala	
HH3 Chhetra K Tamang	
HH4 Kaili Tamang	
HH5 Sushmita Parajuli *	
HH6 Sharadha Parajuli	
HH8 Parvati Ghimire	
HH9 Chanda K Tamang	
HH10 Mana M Magar	

*Farmer leader
Also present some non-survey farmers:
Sano Phul Maya (Nayagaon)
Sita Lama (Nayagaon)
Thulo Phul Maya (Nayagaon)
Myanuka Aryal
Subhadra Sapkota
Huk Kumari Pulami
Suntali Pokharel

Progress with nurseries and fodder cultivation this year
Sushmita reported that nurseries in general were not good this year. She attributed this to a combination of three factors. Some of the seed supplied was not of good quality (Tanki and Gauzuma), households did not give sufficient care to the nurseries which interacted with the third factor that it was a very dry season (rains were late) and extra labour was required for watering. Vegetable production was also making heavy labour demands at this time and farmers considered this of more importance than the future fodder source.
It appears that seed of stylo was not supplied/distributed.

Feed-back from fodder cultivation last year
[Flemengia preferred fodder by two households, yet not included in experiments. Ipil shows poor growth and not preferred at all, yet huge part of experiment. Original plan was to have top line half Ipil, half Flemengia but this didn't happen, why?]

Plans for next year
They are keen to increase their fodder supplies, but have limited time and labour to put into this as have more pressing income generating activities to take care of. Consequently they are interested in low input solutions. Species that can be sown direct, without need of nursery care are particularly popular, such as grass seed and grass slips. However not all preferred species can successfully be propagated this way, for instance Badahar and Tanki. Also Flemengia and Kimbu get a poor start (require good year with long, constant rains to establish well) if propagated this way. Development of a communal nursery is not an option

in this village where there is an individualistic approach to farm development. However a centralised system of nursery production may be a solution to labour constraints if someone from the village was interested in this as an enterprise (perhaps a household with limited land holding and therefore limited options for income generation) and members were willing to pay a small amount for seedlings raised for them. Idea to be discussed with group at next meeting.

Tawari

NGO support to village activities
The facilitator in the village, the school teacher Mr Man Bahadur Tamang, has continued liaising well with NAF and providing support to the farmers group. The NGO to which he belongs, Samaj Sewa Samuha Mahankalchaur VDC, has not managed to officially register as yet. The process continues.

Agricultural activities in the village:
The village is in the process of harvesting the maize crop. Maize stover is collected just after harvest of the cobs and is chopped and fed directly to the livestock when the upper 4-6 leaves are still green. Households are busy shelling and drying the maize. The water mills along the Roshi river are busy grinding corn. Soya bean, frequently grown as an intercrop with maize is also being harvested.
Rice in the small amount of khet land bordering the Roshi is just beginning to ripen.
Milk is collected and transported daily to the dairy at Khobasi. At present production is about 80 litres a day from 20 households in the Magar and Tamang communities. Milk is treated with bicarbonate of soda (about 2-3 tablespoons in 40 litre churns) to prevent curdling during transport. Some degree of dilution was also observed.

Changes in understanding and response to survey questions
As in other villages there was some confusion over the estimation of deficits initially, due to this being a new concept. Farmers also said that initially they felt very shy and unable to say that they didn't understand. To get around these problems they tended to make deficits equal to offer rates. After the training, clarification of bhari weights and talking further with visiting researchers, they say that they had a clearer idea about how to estimate deficits. The deficit question was the only one that they experienced difficulty with.

Seasonal changes in feed offered to Oxen
Two major ploughing times identified:
1. March/April/May - for maize sowing
2. September/October/November – for buckwheat and wheat

Timing varies from year to year depending on the rains. This year the rains were late and the maize planted in May. Only now being harvested so that ploughing will be in October for the winter wheat.

Clarifying changes over time in livestock numbers and productivity in the area
The group confirmed a continuing trend of increasing buffalo and decreasing cow populations. The increase in goat numbers indicated by the survey was described as part of usual seasonal trends, not an absolute increase in numbers.
Some households in the village do have cross-bred buffalo, brought in from Dunkarka. They believe them to be 50% crosses. Four members of the groups have these crossbreds:
HH 6 Samjhana Singtan 1 milking

HH 7	Ranjana Magar	1 milking
HH 8	Laxmi Magar	1 milking
HH 10	Rumila Tumsing	3 milking

The improved breed buffalo require approximately 50% more green feed than the local and also require greater amounts of concentrate.

Concentrate use

The same ingredients are available as in other villages, and in addition some households buy already mixed concentrate from the town, called Dhana. This consists of approximately: 20% rice bran, 40% maize flour, 10% wheat bran, 5% fish meal, 5% soya meal, 5% mustard cake, 3-5% bonemeal and traces of salt (source veterinary JTA).

Buffalo are fed a mixture that is normally cooked. The percentage of each ingredient when made at household level, depends on availability and relative cost. Milking cows are fed the same as buffalo. When not milking they are fed the same as oxen, a mixture of maize flour and home-sourced rice bran (it is not bought).

Goats are fed maize flour only.

Use of crops:

Crop thinnings

The farmers had difficulty in estimating the sowing density of maize. This is because sowing is done by children, who vary greatly in how densely they sow. Farmers say that there is a tendency for the seed to be sown more densely than required and so thinning is required, although this is not purposefully planned. Consequently the amount of thinnings harvested from one ropani varies greatly, from just over one bhari to no thinnings if germination is poor.

Growing crops

Farmers said that they did not feed either maize tops, or maize leaves during the life of the crop as this spoilt quality later on. The whole maize stover is fed at harvest, chopped and sometimes mixed with other green fodders.

General feed-back from group, meeting on 21st September 1999

Present:	Not present:
HH1 Kabita Tamang	HH2 Anita Tamang (Left village to marry)
HH3 Sunita Tamang	
HH4 Rupadevi Bhujel	
HH5 Chameli Tamang	
HH6 Samjhana Singtan	
HH7 Ranjana Magar	
HH8 Laxmi Magar	
HH9 Urmila Magar	
HH10 Rumila Tumsing	
Rekha Magar (new group member)	
Maiya Magar (new group member)	
Facilitator: Man Bahadur Tamang	

Progress with nurseries and fodder cultivation this year

Nurseries were in much better condition this year than last. The impact of training is very obvious. Despite the good nurseries and obvious care taken in cultivation, the group say that they prefer species that can be direct sown. Several members from the Magar community experimented with direct seeding Flemengia this year. Rupadevi has successful germination,

but the other 3 who tried did not (although it has been successful in other villages). Soil quality and the amount of weed growth may be key factors. Members from the Tamang community who used seedlings have had more success with Flemengia this year.
Farmers identified low height of their terraces as a problem in setting out the experimental plots. It caused them to plant the Ipil at the edge of the bhari land, where other crops such as Silam and Soya bean are also grown. Low terrace height also brought the Kimbu plantings close to the lower terrace, which they see as causing problems later when root growth will tend to interfere with ploughing.

Feed-back from fodder cultivation last year
In the very dry conditions at the start of this year most of last years plantings lost all their leaves. The farmers thought that they had died. However they have mostly rejuvenated with the rains and are doing well. Farmers have cut Molasses 2-3 times and Dinanath once. These have been fed to all animals, with more given to those milking.
Considerable differences are seen in the growth of the seedlings and farmers attribute this largely to fertility of the soil. Sunnhemp, initially only found palatable to goats is now fed to all animals and liked by them. Kabita and Rupadevi are particularly keen on the cultivation of sunnhemp as it is easy to propagate, grows fast, is palatable to all and is also a "durable" feed, satisfying hunger for longer. Urmila is keener on Molasses, for the same reasons as the other farmers gave for sunnhemp. These differences may be linked to soil factors (molasses requires greater fertility for high production than sunnhemp), or possibly other fodder sources available to the farmer and therefore the type of feed deficit.

Plans for next year
All farmers in the group are interested to plant further fodder species next year. They are not keen on the stylo and consider that they have sufficient Badahar if they manage to successfully plant out the seedlings currently in their nurseries. Badahar as a fodder is considered equivalent to Guazuma. All the other species tried they would like to grow more of.

Gajurichhap

NGO support to village activities
Mr Chopnidhi Nepal, the secretary for Majhitar Samudyik Bikash Kendra (Majhitar Community development Centre) NGO has been giving support to the group. He has regularly attended meetings and reported back to NAF on a quarterly basis. He produces written reports, but these are not as clear as those produced by other organisations as his writing skills are poor.

Agricultural activities in the village:
Maize is being harvested. It is the vegetable growing season and tomatoes are an important crop from this area. Beans, both climbing (using the maize stems) and bush varieties are also grown at field scale. Vegetables are generally transported to Kathmandu for sale at the Kalimati vegetable market. Little is sold at local markets, although the large cucumbers are consumed locally and sold by the roadside.

Changes in understanding and response to survey questions
Top Bahadur Magar, the leader farmer, identified initial problems in answering questions both on feed allocation and feed deficit. Feed allocation because of the non-standard size of

bhari and deficit because this was a new concept for the farmers. Since the training and introduction of a spring balance in the village, farmers are more aware of relative sizes (by weight) of different bharis. In his case, the questions asked during the survey and growing awareness of importance of deficit levels to overall production, has led him to change how he allocates fodders. He has changed both what he feeds and how this is spread out over the year. For example, rather than just feeding dry crop residues during the lean period he saves some green fodder, particularly Tanki and Ipil from his private plantings to mix with it to provide a better diet. Also, upto last year he didn't save his maize stover for feed, but now he does and feeds to all animals in small amounts upto December. Overall he says that he now probably feeds less overall to his animals, but that he has reduced fluctuations in the amount fed and that this is better for the animal and productivity.

Seasonal changes in feed offered to Oxen

Oxen are only fed more on the days when they are working. When ploughing they are fed Pito as concentrate and more nutritious fodder such as Tanki. When not working they are grazed and fed some green fodder.

There are four seasons for ploughing:

March/April – maize sowing

June/ July – rice planting

November/December – wheat sowing

January/ February – Winter ploughing on bari (1st ploughing for maize)

Clarifying changes over time in livestock numbers and productivity in the area

Previously there were few households in the area and plenty of grazing land. Households tended to keep few buffalo, but lots of cows. The farmers identified an increase in buffalo numbers in the village. Previously only the richer households kept buffaloes, but now all households do. The group also identifies an increase in goat numbers and in cow numbers, though this may be overall numbers, rather than per household. They said that the number of trees on farm had decreased due to the shortage of fuelwood, which has led to cutting and felling.

There are no cross-bred animals kept in the village.

Concentrate use

Milking animals (mainly buffalo) are fed a mixture of maize flour, rice bran when available and vegetable by-products when available. High amounts of vegetable bye-products are fed in August, September and October. After November there is little vegetables produced due to the lack of water and so no significant amounts fed after this time. Dhuto is available in all households around Desai and Tihar, but only in the wealthier households at other times of the year. Only a few households buy in already mixed concentrate. Man Bdr did so for one month, but saw no improvement in productivity in the animals and so stopped. He also heard that one had to continue feeding all year for animal health and to get better productivity and he couldn't afford this.

Goats are only fed maize flour.

Use of crops:

Crop thinnings

The majority of crop thinnings come from maize and upland rice, which both become available at the same time in May/ June. A very small amount of legume thinnings are available in November/ December.

Approximately 25% extra seed is sown to allow for poor germination. Amount of thinnings per ropani varies considerably between farmers and from year to year, but on average the farmers estimated one bhari, 40 kg per ropani. This year in Top Bdr's land there was very good germination and he collected approximately two bharis, 80 kg per ropani. Other farmers reported poor germination and not collecting any thinnings from some fields. Collection of thinnings occurs at about the same time by all farmers.

Growing crops

Maize leaves are collected during the preparation of bari land for relay cropping millet and intercropping with vegetable crops. Green maize stover (the whole plant) is collected from maize grown on khet land before the rice. Where maize is grown on bari land only the leaves are collected for fodder.

General feed-back from group

The village started to control grazing two years ago, when the group was first formed. They were inspired by the desire to improve their on-farm fodder sources and to increase income through vegetable cultivation. Two years ago the farmers report no widespread, field scale cultivation of vegetables. Control is still only partial, but sufficient to allow the new vegetable cultivation. When grazing they insist that there is at least one follower with the livestock.

Research group meeting at Gajurichhap, 23rd September 1999

Present:

HH1 Buddhi bdr Koirala
HH2 Sumitra Magar
HH3 Top bdr Magar (leader farmer)
HH5 Man bdr Koirala
HH6 Lila bdr Magar (arrived later)
HH7 Ek bdr Magar
HH8 Ganesh bdr Magar
HH10 Dhan bdr Magar
Chopnidi Nepal (NGO representative)
Also present:
Kumar Magar
Bed bdr Magar

Not present

HH4 Hari bdr Magar
HH9 Ammar bdr Magar

Progress with nurseries and fodder cultivation this year

Similar number of seedlings and cuttings planted by all households, reflecting use of community nursery for most species. Additional Ipil seedlings cultivated in private nurseries and Eak Bdr Magar planted 1000 NB21 slips, rather than 100 by other farmers. He had the highest survival rate for all species in the nursery too. HH 2 and 8 had low survival rates, 10%, HH1,5,9&10 medium rates, 30-50%, and HH 3,4 and 6 higher rates of 50-70%. Generally the best survival rates of all villages except in the species Guazuma (poor seed) and Kimbu. The Kimbu nurseries required additional watering this year because of the drought conditions and this was too much work for some households. Nursery maintenance was poor by households 2,5,8 and 10.

Feed-back from fodder cultivation last year

Grasses planted last year have already started being productive. Some farmers are using them in a traditional way, mixed with local grasses at the times of year that these are usually fed. Others report saving them (as they do with some of the Ipil too) for the time of year

when they are short of labour. Having fodder readily available on farm means that fodder collection is no longer a burden at this time of year and animals continuing to be fed a good diet. One farmer (leader farmer) has started to alter his overall feeding pattern to livestock, trying to even-out feed amounts to reduce deficits and maintain a more consistent and productive diet regime. This consists of including maize stover (to help make rice straw last longer into the dry season) and to mix some fresh grasses/ green fodder with crop residues.

Plans for next year
Farmers have been propagating fodder species in their communal nursery and planting on their land for four years now, longer than in the other research areas due to the earlier intervention of Tikka Ale in the area. With the introduction of this project, farmers were already familiar with some of the new species and so immediately started propagating large numbers of those they were keen on, Ipil and Kimbu in their private nurseries. This was in addition to keeping-up propagation of limited numbers in the communal nursery. Consequently those that most active are now reaching the limit to the number of further trees they have space for on there land. While clearly stating that tree fodder is their primary concern (and producing fuelwood), farmers are now beginning to focus on grass species as these have only been introduced in the last two years. They are finding that, unlike local species, these are palatable to all livestock and there is still room for them on their land. They are also beginning to see potential for using the new species not just for reducing their current fodder deficits, but for increasing livestock productivity and possibly livestock carrying capacity of the farm.

Gauthale

NGO support to village activities
Internal staff changes within NAF, has meant that Til bdr Magar is no longer representing the partner NGO, Dhusa Bikash Samaj (DBS). Gauthale village had requested that their own local NGO, Langali UNESCO club, be responsible for activities. They did not manage to present their proposal as suggested in Kathmandu on the 2nd of April, and so NAF were obliged to retain DBS as the official partner organisation. A compromise has been reached, however, with DBS employing Dhan bdr Magar (the former farmer's leader and villager's choice for NGO representative). Thulo Toya Magar is now the farmer leader and has been very active. Formally he had been the leading light behind development and maintenance of the communal nursery area. The two activities, communal raising of a limited number of seedlings for all members of the village and individual raising of extra seedlings by the research group members, now seem to be running smoothly in tandem. All appear content with the arrangements.

Agricultural activities in the village:
Farmers are busy harvesting the maize crop. Tomatoes are an important vegetable field crop at this time of year and farmers are busy weeding and spraying for crop protection. The upland rice crop has already been harvested and the straw is in stooks in the field. Fodder collection is also a concern at this time as plentiful supplies are available, both on and off-farm.

Changes in understanding and response to survey questions
Again, difficulty in understanding the survey question about feed deficit was expressed. Difficulty was increased by their initial shyness to ask questions and for clarification.

Despite considerable discussion at the start about the aims of the research, these apparently only became clear to farmers as they talked more with the researchers and attended the training. At first they were wondering what would happen if they said they had a large, or small deficit (possible inflation of deficit reporting, hoping for immediate intervention?). Survey findings in this year will be influenced by their decision to close one area of community forest, Hugdi forest, to fodder collection and grazing from 1999 monsoon. This is in their attempt to get this mixed Sal forest registered officially with the DFO as a community forest. Access to the two other forest areas, Jalbire and Aranga Khure (check names with first report) remain unchanged. They have decided on a fine of 15 rupees for anyone caught cutting fodder in the Hugdi forest. They are managing fodder from their on-farm sources at present, but expect to have to use the forest when these run out, later in the year. They will make a joint decision about this later. Only a little bedding is collected from the forest, generally farmers use maize stover. Collection of dry fuelwood is still allowed.

Seasonal changes in feed offered to Oxen

Four ploughing seasons are identified in the village, but only the first two of these, outlined below, are considered heavy work for the oxen. More feed is given during the heavy ploughing periods, though concentrate is only fed during April/ May ploughing. In the June/July period sufficient good quality green fodder is available to support the oxen.

March/ April/May – maize and upland rice sowing (heavy work)
June/July - preparation for rice in khet land (heavy work)
May/June - weeding in the maize (only a few days and lighter work)
October - sowing of mustard (only a few days)

Clarifying changes over time in livestock numbers and productivity in the area

The group identified a general increase in livestock numbers as households have divided and the population in the area has increased. Specifically they mentioned an increase in buffalo and oxen, also goats, but no increase in the numbers of cows. Again this suggests the same trend seen in other villages, of increasing numbers of buffalo kept, rather than cows, as grazing resources reduce and stall feeding becomes more common. Previously there was plenty of fodder available from the forest areas. These have now become degraded and, with less available and with the recent closure to cutting and grazing in Hugdi forest area, more fodder is collected from on-farm.

Concentrate use

To be followed-up

Use of crops:

Crop thinnings

Children are responsible for sowing the maize and the rate at which it is done can vary considerably. Germination rates in both maize and upland rice are effected by rainfall, quality of seed and subsequent growth on fertility levels. Consequently the amount of thinnings obtained is also very variable. For maize they estimate between none to two bharis of thinnings, 0-80 kg per ropani. In upland rice thinning is done at the same time as weeding and the two are collected together for fodder. They estimate that between none to one bhari of thinnings are collected, which together with weeds may come upto two bharis, 0-80 kg per ropani.

Growing crops

To be followed-up

General feed-back from group during meeting held on the 24th September 1999

Present:
HH1 Thulo Toya Magar
HH2 Krishna Bdr Magar
HH3 Chhabi Bdr Magar
HH5 Kul Bdr Magar
HH7 Yam Bdr Magar
HH8 Lal Bdr Magar
HH9 Khum Bdr Magar
HH10 Dhana Bdr Magar

Not present:
HH4 Lok Bdr Magar
HH6 Bhim Bdr Magar

Progress with nurseries and fodder cultivation this year
Considerable variation between households in numbers of seedlings cultivated, 150-700. Survival rate similar between households except for the very low rates of survival of Kimbu and Flemengia in HH10, which tried to, cultivated a large amount of both. Ipil was the preferred species for cultivation for its properties as a fodder, its pole producing and fuelwood properties and for the fact that it is believed not to deplete soil fertility. NB21 is liked as a fodder, but raises concerns about depleting soil fertility. Other crops are also grown along the edge of terraces such as soya and simla.

Feed-back from fodder cultivation last year
Management of Ipil seems to largely depend on what sized poles the farmers require. When poles for animal shed construction are required, it is only cut twice a year. When smaller poles are sufficient, for example for fuelwood, the trees are cut three times a year. They do not cut during the winter season (during the major deficit period) as this reduces overall productivity of the tree. This also seems to be a consideration for the grasses too. Production of green fodder during the dry season remains a problem.

Plans for next year
Farmers estimate that a further two, in some cases three seasons of fodder planting at current rates should address their fodder deficits. As with Gauthale, they are beginning to experiment more with the grass species.
Dhan bdr introduced the idea that now the group was well on the way to building-up their fodder resources it was time to consider introducing improved breeds of livestock to help increase livestock productivity.

Ange

NGO support to village activities
The project is collaborating with the Inddrawati Public Services committee NGO, whose field activities at Ange are led by Mr Mohan Dhakal. Road closures delayed our visit and Mohan was not present during our time in the field.

Agricultural activities in the village:
Maize has largely been harvested and the remaining millet crop is just heading-up. There is some vegetable cultivation, but on kitchen garden scale for home consumption only. Large quantities of fodder are being collected from communal areas and bari terraces.

Changes in understanding and response to survey questions
They did not differentiate between different sizes of bhari in their answers to amounts collected. Children's bhari loads were counted alongside adult loads. To be further followed-up in discussions with Mohan.

Seasonal changes in feed offered to Oxen
Five separate ploughing periods are identified in the village;
April/ May – sowing of the maize crop (Weeding is not done by plough)
December/ January – sowing of the wheat
January/ February - winter ploughing in preparation for maize
June/July – preparation of khet for transplanting of rice
March/ April – preparation of khet for second rice crop
The greater spread of ploughing work over the year in Ange (compared to other villages) may well explain why concentrates are fed at a low level throughout the year, with more given during actual work periods.

Clarifying changes over time in livestock numbers and productivity in the area
The group identified cattle numbers as decreasing due to reduced labour available to graze and look after the animals. More children go to school and then leave the village to look for outside jobs after schooling. Number of buffalo kept is increasing as farmers want to produce more milk for emerging markets. Two to three years ago there was no market locally for milk. Now there are hotels and dairy outlets. Only two group members keep cross-bred buffalo, Savitri who has two and Lok Kumari who has one.

Concentrate use
Rice bran and maize flour are mixed in roughly 1:2 proportions to make concentrate. A small amount of mustard cake is also added to feed for milking animals.
Goats are fed only maize flour as concentrate. This is cooked for feeding to goats feeding kids. Smaller amounts of non-cooked maize flour is fed to non-lactating goats.
Oxen are fed a little concentrate through the year, with a greater amount fed at ploughing time. They are fed an uncooked mixture of rice and wheat bran with maize flour.

Use of crops:
Crop thinnings
Maize is sown at approximately 25% greater density than final stand required to allow for poor germination. It is weeded twice, one in April/ May and again in June. Only a very few seedlings are taken during the first thinning, the majority are collected in May/June. Again farmers say that amounts collected vary enormously depending on germination rates. Anything from 0-2 bhari, 0-80 kg, are collected in the two thinnings from one ropani.
The millet crop is not thinned, but it is weeded in September and this green fodder fed to livestock. The Khet first rice crop is also weeded in September and the resultant grasses used as fodder.
Likewise the winter wheat crop is not thinned, but weeded in April/May and this green fodder fed to livestock.
Growing crops
Maize tops may be used by some households in the village, if the household is very short of fodder, or labour, but none of the group use themselves regularly. Leaves are used and are harvested as the fields are prepared for the millet planting in July/ August. The leaves are

collected together with the weeds and all offered to livestock. Approximately two bharis of leaves and grasses are collected per ropani.

General feed-back from group
There is a new milk collection point opened at Khalti Khola (15 minutes walk down hill, 30 minutes returning). From tomorrow they will be collecting milk directly from the village, at the school site. Bhim kumari Khadka's husband is involved in collection and says that at present 9 households from the village supply milk, 40 litres a day. Out of the 10 research survey households, five sell to the collection point; HH1, HH2, HH4, HH6 and HH9. (Check…why Bhim K HH1 ranking as seems particularly well off?)

When asked about crop residue use they said that most fed from January to June and sometimes into July. In December mainly millet straw is fed, then from January, more rice straw. [Check data used to produce graphs with high usage levels shown in summer months]

Research group meeting, 27th September 1999

Present:	***Not present***
Bhim Kumari Khadka	Rani Tamang
Santha Kumari Khadka	
Phulthunga Khadka	
Man Kumari Khadka	
Dev Kumari Khadka	
Shuku Rani Lama (arrived late, 10.00am)	
Lok Kumari Khadka	
Savitri Khadka	
Ram Maya Tamang	
Plus several vocal non-survey group members	
Naina Kumari Khadka	
Chitra Kumari Khadka	
Sumitra Khadka	
Tanka Kumari Khadka	
Chandra Kumari Khadka	
Ripula Devi Khadka	
Bishnu Kumari Khadka	
Shree Maya Tamang	

Progress with nurseries and fodder cultivation this year
Nurseries were much better this year than last because they were established in time and farmers benefited from the experience gained in the first year and at the training. Survival of seedlings has been better this year, helped by the long rainy season. Compared to the other villages low numbers of seedlings were cultivated and survival is still lower (10-50%) than that in other villages. Since the establishment of nurseries last year, the village has been controlling grazing on private land, to protect the seedlings. Now that 17 other households in the village are also producing seedlings, support for this initiative has been good. 5-6 members have been fined for allowing grazing of their goats, at a rate of 5 rupees per goat.

Feed-back from fodder cultivation last year
Due to the poor survival of seedlings last year there is limited feed back on farmers opinion of the different species. From their experiences this year (without the experience of how the

species fare during winter) they are impressed with the grasses Molasses and NB21. The quick production of fodder, together with its high palatability and feed value to livestock lead many farmers to rank these above tree fodders.

Plans for next year

Farmers found it hard to say what they would do in the next season, as they are waiting to see how the various species fare in this year. Last year there was high mortality of seedlings during the long dry season (due to late rains). They will discuss and make decisions about next year later. From previous experience, however they know that Kimbhu and Badahar do well in the area and NB21 and Molasses where there is sufficient water (in khet, or shaded north and west-facing bari land). It will be interesting to see if the new milk collection point in the village causes a greater interest in increasing fodder supplies in the demand for seedlings and farmers nursery practice next year.