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Working Paper 5

Farmers' attitudes towards land management strategies:

a Theory of Reasoned Action analysis

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Previous Working Papers

Subedi, A.; Holt, G.; Garforth, C. (2002). *Review of land management policy in Nepal.* Working Paper 1, NRSP research project R 7958, "Developing supportive policy environments for improved land management strategies – Nepal". Reading: The University of Reading. October 2002. pp.28

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CONTENTS

GLOSSARY

AKIS	Agricultural and Knowledge Systems
CBO	Community Based Organisation
DADO	District Agricultural Development Office
DFID	Department for International Development
FYM	Farm Yard Manure
LMS	Land Management Strategies
MOAC	Ministry of Agriculture and Co-operatives
NGO	Non Governmental Organisation
NRSP	Natural Resources Systems Programme
SALT	Sloping Agricultural Land Technology
TORA	Theory of Reasoned Action

1 Introduction

This paper reports research funded by the UK Department for International Development's (DFID) Natural Resources Systems Programme (NRSP) under the title "Developing supportive policy environments for improved land management strategies – Nepal". The project recognises that the policy environment creates incentives and disincentives for individuals, households and other local decision-makers to adopt more sustainable strategies for managing their land resources. It is premised on the twin assumptions that (a) there are land management strategies (LMS), developed and verified through field level research, that are appropriate for uptake on a wide scale beyond the area where the research was conducted; and (b) that there are constraints to their uptake, at both farm and landscape levels, which can be eased through policy decisions in the political and administrative arenas.

Effective management of land resources is an important element in improving the sustainability of local farming systems in the hills of Nepal and enabling them to contribute to poverty alleviation among food-deficit households which have little access to non-farm livelihoods. Many improved land management practices and strategies have been developed and validated at field, community and landscape levels through on-farm, participatory research. But innovations often do not spread beyond the locality in which they were developed. This is partly a question of access to information about such innovations, pointing to the need for development of agricultural and knowledge information systems (AKIS) which can empower households and communities to pursue improved strategies. But constraints on the process of wider uptake and further adaptation occur in central and local government policy-making frameworks, and in the operational policies of development organisations, government departments, NGOs, donors, and private sector bodies.

Efforts to reverse land degradation processes require appropriate incentives for land users, principally farmers both individually and collectively, to change their behaviour. Government policies and the means through which they are implemented are major instruments to influence the behaviour of land users at local and national levels through incentives and sanctions. Without a clear understanding of how policies are made, who is involved in policy formation, how policies are implemented, and the potential impacts of proposed policies on the improvement of land productivity, effective engagement with policy processes to promote land management strategies cannot be achieved.

The aim of the project is to identify constraints to the widespread adoption of farmer-validated land management strategies that are amenable to policy intervention and reform, and to find effective ways of getting these constraints onto the agenda of policy making bodies and processes. The project began formally in March 2001, though implementation in the early stages was delayed through factors largely beyond the control of the project team and NRSP, and is currently due to end in February 2004. Within that broad aim, the three objectives of the project are to:

- identify information and knowledge from recent and current land management research which can be applied on a wide scale in Nepal
- identify and promote constraints to uptake and adaptation of land management strategies, which are amenable to policy intervention

- validate and promote sustainable processes for informing policy discussions at national level, within government policy making structures and within organisations that provide support services to rural land users, identified, validated and promoted.

The present working paper reports findings relating to Output 2. Specifically it presents the results of empirical research, based on the Theory of Reasoned Action (TORA), into the reasons why farmers do and do not take up land management practices which have been validated by research in agro-ecological conditions similar to their own.

2 Methodology

Theory of Reasoned Action

Constraints to the improvement of land management strategies by farmers are being explored within the conceptual framework offered by the Theory of Reasoned Action (TORA – Ajzen and Fishbein 1980[1]). TORA has been applied extensively in a range of disciplinary fields including public health, nutrition, agriculture and forestry to explore the cognitive decision-making process of different social groups. It is acknowledged as one of the most reliable theoretical approaches to understanding the cognitive constructs underpinning individuals' decision making processes (McKemey and Rehman 2003: project Working Paper 4b). It hypothesises that the expressed intent to undertake a particular behaviour is the best predictor of actual behaviour; that behavioural intention is dependent on two factors – attitudes and the subjective norm (which is essentially the social pressure felt by the individual to behave or not behave in a particular way); that attitudes depend on a combination of the individual's belief that a particular behaviour will lead to a particular set of outcomes and the values he or she attributes to those outcomes; and that subjective norms are a function of the individual's normative beliefs regarding how they feel 'important others' would expect them to behave, and their motivation to comply with these 'others' (Figure 1).

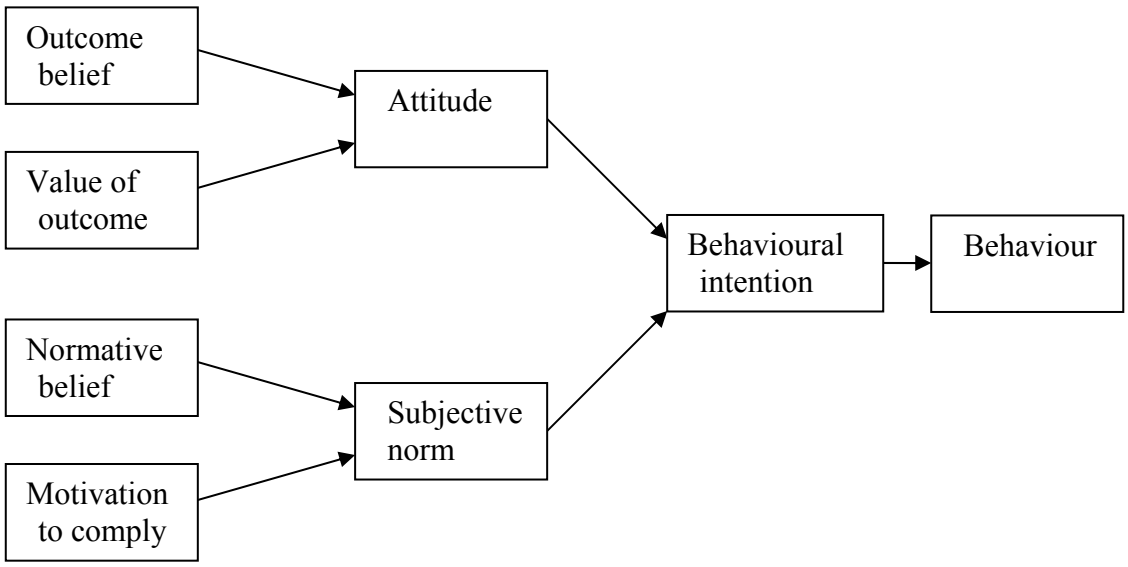


Figure 1 Schematic representation of the Theory of Reasoned Action

[1] Ajzen, I, and Fishbein, M (1980) Understanding Attitudes and Predicting Social Behaviour Englewood Cliffs, New Jersey. Prentice Hall.

The fieldwork element of the TORA methodology comprises two main steps: qualitative field research based on semi-structured interviews and group discussion, to elicit output beliefs and social referents; followed by a sample survey using a formal questionnaire to assign quantitative values to the separate constructs in the model. Correlation analysis shows the strength of relationships between the various constructs. The outputs of the analysis can then be used to plan information, advisory and policy interventions to address those factors which are most strongly associated with the performance or non-performance of the behaviours – in the present case, land management strategies and the specific technologies and practices through which they are expressed. The main purpose of using TORA in this project was not, however, to design information and advisory programmes for farmers, but to identify constraints and motivating influences which might be amenable to policy intervention.

Capacity Building/Training

Both stages of the TORA fieldwork were carried out by researchers from LI-BIRD and ARS Lumle, NARC, with the support of the UK members of the research team. An initial period of training and capacity building in TORA concepts and methods was initiated by the UK researchers. This explained the use of qualitative methods to generate statements for a TORA questionnaire and the theory behind the TORA construct, thereby fostering ownership of the TORA methodology among the Nepalese researchers.

Research Orientation and Discussion

In-depth discussion took place on the importance of collecting data that go beyond descriptions of farmers' land management practices to focus on the beliefs and values that influence farmers in their decision-making and actions on land management. There were detailed discussion regarding the concept of land management strategies and other terminology associated with it. The team's approach to discerning farmers' strategies was to look at principal land management issues articulated by farmers and the combination of practices they employ at the farm-level to address these issues. Two key land management issues were identified based on discussions with farmers during the fieldwork for the validation of technologies earlier in the project (Regmi et al. 2002; project Working Paper 3): soil fertility management and soil conservation. The practices and techniques which farmers relate to the addressing of these issues link soil, livestock, tree and crop management systems.

Fieldwork: stage one

The first stage of TORA involved conducting semi-structured interviews with a sample of households. The interviews were guided by a checklist that was developed with reference to the outcome of focus group discussions which had been conducted in an earlier phase of the project by the research team. The checklist focused on the two major issues in land management identified above - soil conservation and soil fertility management. Under these two broad issues, six land management practices were identified:

a. Increased dependency on FYM
b. Increased dependency on Chemical Fertilizers
c. Cutting rather than pulling legumes when harvesting
d. Planting hedgerows (live barriers)
e. Stall feeding of livestock
f. Planting fodder trees.

The qualitative field research was conducted in six villages representing two major altitude ranges, areas where sloping agricultural land technology (SALT) is deemed to be appropriate, and areas which have and have not been exposed to research and/or extension on land management. Desk study, discussions with research organizations, NGOs and CBOs and a review of recent and current research to identify land management practices which have been locally adopted and adapted and have potential for widespread adoption, had been carried out prior to the TORA study (Regmi et al., op.cit.). Areas which had been exposed to research and/or extension were identified for both soil fertility management and soil conservation. Details of the sites selected for the first stage of the TORA fieldwork are shown in Table 1. These sites were selected also to be broadly typical of the area in which they are located, in terms of ethnicity, accessibility and proportion of female headed households.

Table 1. Sites used for first stage of the TORA fieldwork

District	Site	low hill	mid hill	river basin	exposed	not exposed	SALT	non SALT
Chitawan	Paireni	X			X		X	
Tanahu	Duwabesi	X				X		X
	Chambas			X	X			X
	Bhansar			X		X		X
Parbat	Pang		X			X		X
	Lower Pakuwa	X			X			X

Interviews were conducted with both men and women members of twenty nine households representing a cross section of ethnic groups. Interviews took place in the interviewees' houses. Apart from the household members, other neighbours also joined the interview. The presence of other people apart from interviewee raised many issues and also helped the researchers to triangulate the information collected. Higher participation was observed and lot of information was drawn from the discussion. Salient outcome beliefs regarding the key land management issues and social referents were identified from the process. The interview schedule comprised mainly open questions. Researchers probed and prompted during the discussion in order to obtain in depth responses.

Simple statistical analysis was used in order to identify salient beliefs and social referents from the large number mentioned by farmers. This was done through ranking. Each outcome belief and referent was given a score equal to the number of interviews in which it was mentioned. Those with the higher scores were deemed to be salient. In keeping with standard TORA practice, approximately 10 statements were required for each behaviour under investigation. Table 2 summarises the salient outcome beliefs and referents for each of the six areas of land management decision. The full list of outcome beliefs and referents is shown in Appendix 1.

Table 2 Salient outcome beliefs and referents from stage one fieldwork

LM practice	Salient outcome beliefs	Salient referents
Increased dependency on mul	Forest is too far to bring leaf litter Mul will increase crop production (yields)	Experienced farmers Neighbours

LM practice	Salient outcome beliefs	Salient referents
	Mul alone will not meet the needs of some crops Will not have the labour to manage the mul Mul will improve the soil Mul will be good for crops Will lead to increased insect problems Will not have sufficient livestock Will have to mix mul with chemical fertiliser Will lead to reduced crop yields There will not be sufficient mul for the crops	Family Research agencies
Stall feeding of livestock	Animals will be healthier Lead to increased disease (pests and insects) All animals need to graze/exercise sometimes Will have access to forest for additional fodder Will improve the protection against wild animals It will reduce crop damage Mul decomposes better when mixed with urine Will not have enough fodder to feed the animals Lead to increased work load (labour) More mul will be produced	Research agencies Community Neighbours Family
Increased dependency on chemical fertiliser	Will lead to increased weed problems Will lead to increased insect problems Will not know how to apply it properly Will lead to acidic soil Will help control weeds and pests Will not be able to buy the amounts needed Will only benefit if combined with mul Will increase the leafy growth of cereals Land will become difficult to plough or dig (till) Amount needed will increase each year Will destroy the soil over the long term Soil will become hard Will increase production of crops	Experienced farmers Family Community Supplier or store keeper Research/extension agency Neighbours
Cutting rather than pulling legumes	Will not loosen the soil Will make no difference Will provide feed for livestock Will be more difficult to harvest maas Makes harvesting easier Cutting will produce good soil (soft) Clean grain (without soil and stone) Cutting will increase the soils fertility	Family Neighbours Community Research/extension agency
Planting hedgerows	Roots will take up some of the field Will provide fuel wood Roots will increase soil fertility Hedgerows will provide multiple benefits? Roots will make ploughing difficult No support available Leaf litter will provide mul Will help hold the soil (prevent soil loss) Will provide fodder / forage	Family Community Research/extension agency
Planting fodder trees	Will fertilise the soil via their leaf litter No support for outside (training) It will be difficult to find seedlings The will help hold the soil (prevent soil loss) Increased fuel wood supply The shade will be a problem for other crops Will provide fodder for livestock	Family Community Research/extension agency Forest user group

Fieldwork: stage two

Based on the analysis of data from the first stage, a structured questionnaire for the second stage was developed. The questionnaire sought information on farmers' awareness, implementation and intended implementation of each of the six land management behaviours. Implementation was measured using an index comprising a set of specific practices representative of each behaviour. Intentions were measured on a five point scale (-2 to +2) representing the likelihood of the respondent implementing the behaviour within the following twelve months. Outcome beliefs were measured by the level of agreement or disagreement with each outcome belief statement on a five point scale. The perceived importance (outcome evaluation) of each outcome was also measured on a five point scale and outcome attitudes calculated by multiplying each outcome belief by the corresponding outcome evaluation. A subjective norm was calculated for each salient referent as the product of the extent to which the referent was thought to be supportive of the behaviour and the motivation of the respondent to comply with that referent, both components also measured on a five point scale. A copy of the questionnaire can be found in Appendix 2.

After piloting and revising the questionnaire in a site that was not included in the survey itself, the research team completed the second phase of the fieldwork through interviews in twelve locations with a total sample of 240 respondents. Stratified random sampling was used to ensure adequate representation of men and women, and different livelihood categories. Local people were consulted and used during the sampling process. Ethnicity, distance from roads and exposure to research and extension on land management were considered during the site selection. Interviews with respondents were scheduled beforehand in order to ensure enough time for the meeting. Interviewers spent some time with other non respondent farmers in the villages to derive some information for cross examining some of the output. During the interview, the researchers ensured that all details required in the questionnaire were asked and recorded. Table 3 shows the interview sites.

Table 3 Sites used for second stage of the TORA fieldwork

District	Site	low hill	mid-hill	high hill	river basin	exposed	not exposed	SALT	non SALT
Chitawan	Paireni	**X**				**X**		**X**	
Tanahu	Duwabesi	**X**					**X**		**X**
	Chambas				**X**	**X**			**X**
	Bhansar				**X**		**X**		**X**
Parbat	Pang		**X**				**X**		**X**
	Shankeri-Pokheri	**X**					**X**		**X**
	Upper Pakuwa		**X**			**X**			**X**
	Lower Pakuwa	**X**				**X**			**X**
Palpa	Nayatola		**X**			**X**		**X**	
	Kusumkhola		**X**				**X**	**X**	
Myagdi	Bhakimle			**X**		**X**			**X**
	Barumja			**X**			**X**		**X**

Data Analysis

The collected data were carefully compiled and encoded into a computer database using Excel. Data analysis involved calculation of Spearman correlation coefficients between the various TORA elements, with Mann Whitney U test as the main inferential test. For this and other simple statistical analysis, SPSS for Windows was used. The findings were presented in summary form at a workshop for policy stakeholders in Kathmandu in September 2003. Discussions at that workshop have informed the interpretation of the findings presented in section 3 below.

3 Findings

The survey questionnaire was designed to enable us to measure the key TORA variables in relation to the six areas of land management decision. These variables were:

- Current behaviour in respect of each area of decision, measured on a scale representing a number of separate practices relating to the behaviour
- Intention to continue or change behaviour during the next one year
- Outcome attitude for each of the outcome beliefs identified during the initial phase of the research, measured as (outcome belief) x (value of outcome)
- Overall attitude towards each behaviour, measured as the sum of all outcome attitudes
- Referent subjective norm for each salient social referent, measured as (normative belief about the social referent) x (motivation to comply with that referent)
- Subjective norm, measured as the sum of all referent subjective norms for the behaviour.

In addition to the calculated attitudes and subjective norms, measures of "stated attitude" and "stated subjective norm" were also taken.

The main part of the analysis involves calculating the correlations[2] between each of the elements and the expressed intention to continue or change behaviour. For the present study, interpreting the data focused on three key sets of correlations. First, a lack of significant correlation between behaviour and intention indicates a degree of dissonance, prompting the question what is preventing the farmer from behaving in accordance with his or her expressed intentions. This would suggest a potential for a change in behaviour provided any barriers to the change could be overcome. For this study, a relevant question would then be whether any barrier is amenable to policy change or intervention.

Second, a significant correlation between an outcome attitude and intention indicates that the attitude is either a barrier or a driver (depending on the sign of the coefficient and whether the outcome belief is positively or negatively expressed) to change. Barriers represent opportunities to identify and remove constraints, while drivers suggest attributes or consequences of the behaviour which could be highlighted to promote it among those currently not practising it.

[2] Spearman rank correlation coefficients are used because the data are ordinal. Mann-Whitney test is used to determine statistical significance.

Thirdly, the relative strengths of the correlations between attitude and intention, and between subjective norm and intention, will suggest the relative emphasis that should be given to cognitive and to normative elements in any strategy to promote the behaviour.

The data on intention and behaviour in Tables 1 and 2 below suggest dissonance in respect of three of the behaviours – depending on mul, depending on chemical fertiliser, and planting fodder trees. Table 2 indicates that although the proportions of farmers using mul, using fertiliser, stall feeding and planting fodder trees are high, there is scope for an increase in the intensity or quality of their practices.

Table 1 Strength of behavioural intention and correlation with behaviour for the whole sample (n=254)

Behavioural decision area	Strength of behavioural intention (mean, median)(1)	Correlation with behaviour
Increase reliance on *mul* for soil fertility	Strongly positive (1.29, 2)	Not significant (>0.05)
Increase reliance on chemical fertiliser for soil fertility	Strongly negative (-0.88, -1)	Not significant (>0.05)
Planting hedgerows	Neutral (-0.04, 0)	Significant (<0.001)
Cutting instead of pulling legumes at harvest	Strongly positive (1.17, 2)	Significant (<0.001)
Stall feeding livestock	Positive (1.1, 2)	Significant (<0.05)
Planting fodder trees	Very strongly positive (1.54, 2)	Not significant (>0.05)

Note: (1) mean for whole sample: -2 to +2

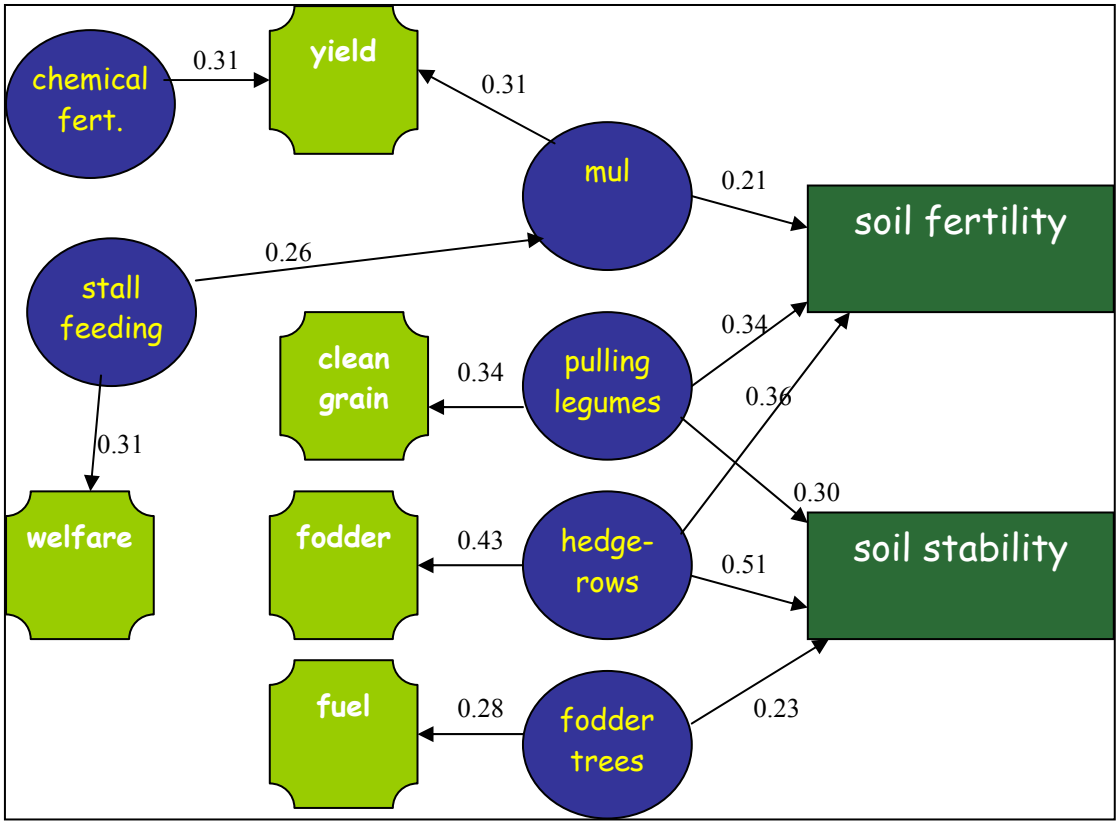
Table 2 Indicators of current levels of practice in relation to the six behaviours for the whole sample (n=254)

Behaviour	Current level (mean; scale)	Comments
Use of *mul* for soil fertility	-3.15; -10 to +10	of ten mul practices, only one (adding leaf litter) done by more than 50%
Use of chemical fertiliser for soil fertility	-0.19; -4 to +4	81% use chemical fertilizers – 77% combined with mul
Planting hedgerows	-3.76; -5 to +5	14% have planted hedgerows
Cutting instead of pulling legumes at harvest	+2.25; -6 to +6	58% cut rather than pull legumes (90% with extension; 29% without)
Stall feeding livestock	-0.2; -3 to +3	70% stall feed all year
Planting fodder trees	-0.59; -4 to +4	87% planted fodder trees (16% purchased seedlings)

Table three shows the principal drivers or motivators identified for the sample as a whole. These are the outcome attitudes which correlate significantly with behavioural intention. They show clearly that improvements to soil and prevention of soil loss are important drivers, alongside other more immediate benefits. This is shown schematically in Figure 1.

Table 3 Cognitive drivers

Behavioural decision area	Drivers (whole sample)
Increase reliance on *mul* for soil fertility	mul will be good for crops mul will improve the soil
Increase reliance on chemical fertiliser for soil fertility	fertiliser will increase crop production
Planting hedgerows	hedgerows will prevent soil loss hedgerows will provide multiple benefits roots will increase soil fertility
Cutting instead of pulling legumes at harvest	clean grain production cutting will result in good soil
Stall feeding livestock	animals get better care; protection more mul will be produced mul will compost rapidly from urine
Planting fodder trees	will increase fuelwood supply will provide more fodder will prevent soil loss



Note: numbers indicate Spearman rank correlation coefficients between attitude and intention (all significant at 0.05 level)

Figure 1 Main drivers for six behaviours relating to soil fertility and soil stability (whole sample)

The significance of the various drivers differs considerably with topography and with exposure to extension, the two factors on which the sample was stratified; and with socio-economic characteristics of gender, age, education, household size, distance to market, economic status, and affiliation to groups and organisations. This is even more the case with barriers to a change in behaviour. The only barrier which appears to operate at the level of the sample as a whole is the belief that chemical fertiliser will make soil hard and difficult to plough or dig. Table 4 shows some of the main barriers for specific categories of respondent.

Table 4 Cognitive barriers to behaviours for specific subsets of farmers

Behavioural decision area	Cognitive barrier	Farmers for whom the barrier is operative (1)
Increase reliance on *mul* for soil fertility	mul alone won't meet the need of the crop forest is too far to transport leaf litter relying on mul will lead to reduced yields insufficient livestock	low hills exposed to extension; primary education; within an hour of market; river basin not exposed to extension; SALT areas; primary education; low hills not exposed to extension; those with no education; river basin exposed to extension; not affiliated to farmer group
Increase reliance on chemical fertiliser for soil fertility	soil will become hard and difficult to plough or dig	whole sample
	increase in weeds and/or leafy growth	high hills exposed to extension
	soil will become acidic or damaged	river basin not exposed to extension
	unreliable supply of fertiliser	high hills not exposed to extension
Planting hedgerows	roots will make ploughing difficult no seedlings available	no experience of planting hedgerows; distant from market; not exposed to extension no experience of planting hedgerows; distant from market; not exposed to extension
Cutting instead of pulling legumes at harvest	(none)	
Stall feeding livestock	not enough fodder to feed animals dependent on forest for extra fodder	women; high hills mid-hills not exposed to extension; farmers with some Kharbari land; smaller holdings
Planting fodder trees	difficult to find seedlings lack of village co-operation shade is a problem for crops	women; far from market; not members of an organisation; mid-hills exposed to extension 24-40 years old; most educated no formal education; not members of an organisation

Notes: (1) This list is indicative rather than exhaustive. A full analysis of barriers and drivers for different categories of farmer is given in the six Annexes which contain detailed analysis for each of the six behavioural decision area.

The main social referents identified by respondents fall into two broad categories: local and external to the village. The latter include extension agencies in the government and non –government sectors as well as commercial input suppliers such as shopkeepers. The former include CBOs such as forest user groups and the community as a whole, as well as family members, neighbours and other farmers. Table 5 shows the influential social referents for each of the six behaviours, in decreasing order of influence, for the sample as a whole. Again, there are significant differences between categories of respondent. With respect to *mul,* for example, the most influential referent with those farming mid and high hill areas is their family, while farmers managing low hill, river basin and SALT zones are more reliant on their own experience to make soil fertility decisions. However, social referents are

also influential, particularly extension and research agencies, especially with those not exposed to extension in the river basin. For those exposed to extension in the SALT zone other farmers and neighbours are also influential referents. With fodder tree planting, households of lower economic status are more likely to be influenced by the community and forest user group than by extension agencies, who are more influential with those of higher economic status. With hedgerow planting, women are more likely to feel negative influence from community and family, while for men as a whole these, along with extension agencies, are a positive influence on behavioural intention: these differences cancel each other out when the sample is taken as a whole.

Table 5 Influential social referents

Behavioural decision area	Social referents with significant correlations between subjective norm and behavioural intention (whole sample)
Increase reliance on *mul* for soil fertility	Extension agencies (government and NGO) Neighbours and family Experienced farmers
Increase reliance on chemical fertiliser for soil fertility	Shopkeepers (negative subjective norm)
Planting hedgerows	(none)
Cutting instead of pulling legumes at harvest	family and neighbours community extension agencies (government and NGO)
Stall feeding livestock	neighbours and family community extension agencies (government and NGO)
Planting fodder trees	family community extension agencies forest users group

4 Policy implications

Our analysis of the data so far suggests several potential policy implications. One common thread is that local R&D and extension activity has been effective. There are significant differences in many aspects of the behaviours between farmers who have been exposed to extension and those that have not. Another is that extension programmes need to be responsive to differences between areas (topography, farming system) and categories of farmer and household.

Zone sensitivity in extension applies particularly to promoting the better management and use of *mul*, with the technical content of extension reflecting the availability of leaf litter and other organic matter. Promoting tree planting to provide more leaf litter would be an option where this is a constraint. More generally, the decline in livestock numbers suggests that promoting the production of higher quality *mul* and of using it as efficiently as possible will be increasingly relevant to many households. At the same time, particularly for households with few or no livestock, work on developing and promoting alternative means of soil fertility management (including green manure and improved rotations) should continue. In some places in Nepal, a market in animal manure has emerged (e.g. between intensive poultry operations in the Hetauda area and commercial vegetable producers in the Pokhara Valley): there may be ways in which government and NGO agencies can facilitate the development of more local markets in *mul*. There are also implications here for the management regimes adopted

by forest user groups, who control access to forest resources which are vital for many farmers' production of high quality *mul* in sufficient quantities.

The need for policy and effective policy implementation relating to fertiliser has already been taken on board by MOAC, with the new (2002) Fertiliser Policy. Local testing of the quality of fertilisers available in the market can help to counter the uncertainty and vulnerability that farmers face. Empowering farmers through better information on nutrients in chemicals, through enabling CBOs to undertake quality testing and generally and through encouraging them to demand quality testing from DADOs may help make current policy more effective. On the extension front, a more balanced emphasis on the use of fertiliser within an overall nutrient management strategy which will maintain soil quality rather than focusing only on maximising production is also reflected in the current fertiliser policy.

With hedgerows, a major constraint is the lack of seedlings. Facilitating the development of local nurseries, and supporting the farmer-to-farmer supply of seedlings, are obvious starting points in areas where hedgerow planting is a viable option for farmers. Participatory technology development to adapt (species, spacing, management) the technology to new areas will be important. To overcome barriers to uptake, extension should address negative perceptions about rooting systems and encourage a more informed assessment of competition. This could be linked effectively with extension on the continued maintenance and management of hedgerows to optimise benefits and minimise negative effects.

Extension has been effective in promoting the cutting rather than pulling of legumes, particularly in raising awareness of the soil fertility effects. This awareness is lower among women, suggesting that it would be sensible to focus attention on female members of farming households – who are in any case more likely than men to be the ones harvesting legumes and so will be making the on-the-spot decision. The clean grain benefits could also be emphasized; but for farmers who are growing legumes for sale this will not be a strong motivator unless they are able to secure a price differential for clean grain. There is perhaps a role for CBOs here in promoting the idea among consumers and farmers alike.

Although stall feeding is widely practised, there is scope for enhancing current practice. As with *mul*, a critical factor in some areas will be the way in which community forest is managed, given the significance of "dependence on forest" as a barrier for some categories of farmer. At the same time, promoting the planting of trees on farmers' own land and the forage benefits of hedgerows would increase fodder availability.

Appendix 1: Outcome beliefs and referents elicited during stage one

1 Increased dependency on *mul* (FYM)

1a Outcome beliefs

Code	Outcome belief	Score[1]
m2	Mul alone is not enough for the soil	1
m3	We will have to get leaf litter from the forest	1
m4	Forest is too far to bring leaf litter from	4
m5	Mul will be good for crops	7
m6	Relying on mul will lead to reduced crop yields	16
m7	Mul will increase crop production (yields)	4
m8	There will not be sufficient mul for the crops	29
m9	Relying on mul will lead to increased insect problems	7
m10	Mul will improve the soil	6
m12	Will not have the man power (labour) to manage the mul	5
m13	Will not have sufficient livestock	10
m14	Will not be able to plough soon enough to prevent mul loosing its goodness	2
m16	Will have to mix mul with chemical fertiliser	11
m17	Mul alone will not meet the needs of some crops	4
m19	Will have to buy mul from neighbours	2
m20	Will not have sufficient forage to rely on mul	3
m21	Slow release of nutrients to crop	3
m22	Weak plants (crops)	3

Note: [1] Score = number of interviews in which the belief or referent was mentioned

1b Social referents

Referent	Score
Family	7
Older people	2
Experienced farmers	3
(ICIMIOD / NSRC / SAPPROS / LARS)	9
Neighbours	6

2 Stall Feeding of livestock

2a Outcome beliefs

Code	Outcome belief	Score
s1	Will improve the protection against wild animals	5
s2	Will not have enough fodder to feed the animals	10
s2	More mul will be produced	24
s3	Mul will decompose better due to urine being mixed with it	8
s4	It will reduce crop damage	7
s5	The animals will be less prone to accidents	1
s6	Lead to increased work load (labour)	12
s7	Animals will get better care	1
s8	Mul is not wasted	1
s9	Will have access to forest for additional fodder	4
s10	Will not have enough grain to feed the animals	1
s12	Animals will be healthier	2
s13	Lead to increased disease (pests and insects)	2
s14	All animals need to be grazed sometimes (exercised)	3
s16	Will have difficulty providing drinking water for the animals	1
s17	Disease transfer from neighbours animals will be reduced	1
s18	More milk production	1
s20	Increased rodent problem	1

2b Social referents

Referents	Score
Family	19
Community	9
Neighbours	9
Spouse	2
ICMOD etc	3

3 Increased dependency on chemical fertiliser

3a Outcome beliefs

Code	Outcome belief	Score
c1	Land will become difficult to plough or dig (till)	9
c2	Soil will become hard	21
c3	Will increase production (yield) of cereals (e.g. Maize/upland rice/ wheat)	23
c4	Will not know how to apply it properly	4
c5	Will increase the leafy growth of cereals	8
c6	Increased use of chemical fertilisers will destroy the soil over the long term	10
c7	Provides only short term good production	2
c8	Too much chemical fertiliser will rot and kill crops (burn)	1
c9	Will lead to increased vegetable production	2
c10	Will lead to acidic soil	4
c11	Will only benefit if combined with mul	7
c12	Will not be able to buy the amounts needed (quantity)	5
c13	It will lead to increased crop sales (income)	1
c16	Will lead to increased weed problems	2
c17	Will lead to increased insect problems	3
c18	The chemical fertilisers will not be available when needed	1
c19	Will help control weeds and pests	4
c20	Crops will grow faster	1
c21	The amount of chemical fertiliser needed will increase each year	9
c22	Quality of fertiliser is unreliable	1

3b Social referents

Referent	Score
Supplier or store keeper	12
Neighbours	18
Family	3
Experienced farmers	2
SAPROS / LARS / DADO / JTA etc	16
Community	6
Self	2

4 Cutting rather than pulling legumes

4a Outcome beliefs

Code	Outcome belief	Score
c1	Clean grain production (cleaner product without soil and stone)	9
c2	Cutting will produce good soil (soft)	8
c5	It will demand too much work	1
c6	Will provide feed for livestock	3
c7	More difficult to hang and dry legumes	1
c8	Makes harvesting easier	5
c9	Cutting will increase the soils fertility	10
c10	Will mean less problems with transportation	1
c11	Will not loosen the soil	2
c12	Will save the soil	1
c13	Will make no difference	2
c14	Will mean it will be more difficult to harvest maas	3
c15	Soil will be lost	1

4b Social referents

Referents	Score
Family	20
Neighbours	6
Community	6
Self	6
LARS etc	5

5 Planting hedgerows

5a Outcome beliefs

	Results of hedgerow planting	
h1	Will help hold the soil (prevent soil loss)	8
h2	Roots will take up some of the field	2
h3	Roots will make ploughing difficult	3
h4	Will provide fodder / forage	9
h5	Leaf litter will provide mul	5
h7	Will provide fuel wood	2
h9	Roots will increase soil fertility	2
h10	Hedgerows will provide multiple benefits?	2
h12	No support available	3
h13	Seedlings not available	1
h16	Will help develop terraces over time	1

5b Social referents

Referent	Score
Family	7
Community (Neighbours)	4
CIMOD / NARC /LARS etc	5

6 Planting fodder trees

6a Outcome beliefs

Code	**Outcome belief**	**Score**
t1	Neighbours animals will destroy young seedlings	1
t2	The will help hold the soil (prevent soil loss)	10
t3	The shade will be a problem for other crops	16
t4	Will provide fodder for livestock	20
t5	Will fertilise the soil via their leaf litter	2
t6	Lack of village co-operation will make it difficult to plant trees	1
t8	Attract birds which will attract the crop	1
t9	Increased fuel wood supply	14
t10	It will be difficult to find seedlings	4
t12	More difficult to grow crops	1
t14	No support for outside (training)	3

6b Social referents

Referent	**Score**
Family	15
Community (Neighbours)	8
LARS	2
Self	2
Community forest group	5
Old folk	2

Appendix 2: TORA questionnaire (English version)

INTERVIEW SCHEDULE
(LMS-TORA SURVEY- 2nd Stage)

District:_____ **Entry # (_____)**

Name of Community:_____ Date of Interview:_____

PART I. Respondents' Data

1. Name of Respondent:_____

2. Age: ( ) < 16 yrs.
( ) 16-24 yrs.
( ) 25-40 yrs.
( ) > 40 yrs

3. Gender: ( ) Male ( ) Female

4. Ethnicity:_____

5. Educational attainment:
a. No schooling/
b. Non-formal
c. Primary school
d. Secondary school / High school
e. Post secondary / College / University

6. Household size: ( ) Less than 5
( ) 5-8
( ) More than 8

7. Occupation: ( ) Purely Farming
( ) Farming and Business
( ) Government services
( ) Labor wage
( ) Others, If any Specify:_____

8. Economic status: ( ) High- Food sufficient for whole year + additional income
( ) Medium- Food hardly sufficient + little income
( ) Low – Food not sufficient, need to do wage labor

9. Type of Land: ( ) Khet and Bari
( ) Khet, bari and kharbari
( ) Khet, bari and sloping
( ) Sloping land
( ) Others: _____

10. Land size:

Type of Land	Area (ropani)
1. Khet 2. Bari 3. Kharbari 4. Sloping 5. Others	

11. Land Tenure Status:

( ) Owner cultivator
( ) Share Tenant
( ) Lessee
( ) Others, if any:_____

12. Distance to nearest Market:

( ) More than 4 hours
( ) 2-4 hours
( ) Less than 1 hour

13. Number of Livestock:

Buffaloes	
Cows/ox	
Goats	

14. Do you have exposure to extension?

( ) Yes ( ) No

If yes, In which
Areas:_____

15. Do you have access to support services?

( ) Yes ( ) No

If yes, In what
types/kinds:_____

16. Are you affiliated with any organisation?

( ) Yes ( ) No

If yes, with which organisation/s?

_____

2. Increased dependency on MUL

2a. Could you indicate if you have or have not carried out any of the following actions over the past year on your farm:

(Read the different actions in turn and tick the box which indicates their response to each.)

	Mul production methods used in the last 1 year	**Yes (+1)**	**No (-1)**
Mbx1	Composting		
Mbx2	Using a plastic cover		
Mbx3	Green manuring		
Mbx4	Depositing animal waste in a pit		
Mbx5	Regular turning of animal waste		
Mbx6	Adding leave litter to animal dung		
Mbx7	Mixing urine and water		
Mbx8	Dumping in one place (heap making)		

Intention

2b. How strongly do you intend to increase your dependency on Mul in the next year?

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Attitude

2c. How good or bad is it to increase your dependency on Mul in the next year?

Very good	Good	No opinion	Bad	Very Bad
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Beliefs

(Read the following introduction and then each statement in turn ticking the response to each on the two scales which correspond to questions 2d. and 2e)

The words I am about to read are what other farmers are saying about increasing their dependency on mul.

2d. In your opinion are the following statements true or not?

2e. Could you also indicate how good or bad the outcome of each statement would be?

m1 Mul alone will not meet the needs of some crops

Very true	True	Don't know	False	Very False
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Very good	Good	No opinion	bad	Very Bad
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

m2 Forest is too far to bring leaf litter from

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

m3 Mul will be good for crops

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

m4 Relying mainly on mul will lead to reduced crop yields

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

m5 There will not be sufficient mul for the crops

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

m6 Relying on mul will lead to increased insect problems

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

m7 Mul will improve the soil

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

m8 Will be too much work for the family

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

m9 Do not have sufficient livestock

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

m10 Will have to apply chemical fertiliser with the mul for some crops

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

m11 Crops will not be able to take advantage of mul immediately

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Subjective Norm

2f. How likely is it that the people **who you respect most** would think you should increase your dependency on mul in the next year?

Very likely	Likely	Don't know	unlikely	Very unlikely
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Motivation

2g. How motivated would you be to follow the advice of the following regarding increasing your reliance on mul in the next year?

msm1 Family

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

msm2 Experienced farmers

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

msm3 (ICIMIOD / NSRC / SAPPROS / LARS)

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

msm4 Neighbours

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Normative beliefs

2g. Indicate how strongly the following would agree or disagree with you increasing your dependency on mul in the next year?

msb1 Family

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

msb2 Experienced farmers

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

msb3 (ICIMIOD / NSRC / SAPPROS / LARS)

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

msb4 Neighbours

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

2h. Whose advice would you respect most regarding the management of mul?
(Write down the social referent mentioned without prompting the subject)

_____

3. Increased reliance on 'Chemical' fertiliser

3a. Could you indicate if you have or have not carried out any of the following actions regularly over the past year:

(Read the different actions in turn and tick the box which indicates their response to each.)

	Use of chemical fertiliser over the past 1 year	**Yes (+1)**	**No (-1)**
Cbx1	Used chemical fertiliser on your crops		
Cbx2	Used only chemical fertiliser		
Cbx3	Mixed chemical fertiliser with manure		
Cbx4	Use very little chemical fertiliser		

Intention

3b. How strongly do you intend to increase your reliance on chemical fertiliser over the next year?

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Attitude

3c. How good or bad is it to reduce or continue not using insecticide in the next rice crop?

Very good	Good	No opinion	Bad	Very Bad
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Beliefs

(Read the following introduction and the each statement in turn ticking the response to each on the two scales which correspond to questions 3d. and 3e)

The words I am about to read are what other farmers are saying about increased reliance on chemical fertiliser .

3d. In your opinion are the following statements true or not?

3e. Could you indicate how good or bad each of the outcome of each of the statements are?

c1 Land will become difficult to plough or dig

Very true	True	Don't know	False	Very False
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Very good	Good	No opinion	bad	Very Bad
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

c2 Soil will become hard

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

c3 Will increase the production of crops

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

c4 Will not know how to apply it properly

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

c5 Will increase the leafy growth of cereals

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

c6 Increased use of chemical fertilisers will destroy the soil over the long term

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

c7 Will lead to acidic soil

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

c8 Will only benefit if combined with mul

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

c9 Supply of chemical fertiliser is unreliable

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

c10 Will lead to increased weed problems

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

c11 Will lead to increased insect problems

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

c12 Will help control weeds and pests

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

C13 Will have to increase the amount of chemical fertiliser used each year

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Subjective Norm

3f. How likely is it that the people **who you respect most** would think you should increase your reliance on chemical fertiliser in the next year?

Very likely	Likely	Don't know	unlikely	Very unlikely
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Motivation

3g. How motivated would you be to follow the advice of the following regarding increasing your reliance on chemical fertiliser in the next year?

csm1 Supplier or store keeper

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

csm2 Neighbours

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

csm3 Family

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

csm4 Experienced farmers

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

csm5 SAPROS / LARS / DADO / JTA etc

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

csm6 Community

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Normative beliefs

3h. Indicate how strongly the following would agree or disagree with you increasing your reliance on chemical fertilisers in the next year?

csb1 Supplier or store keeper

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

csb2 Neighbours

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

csb3 Family

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

csb4 Experienced farmers

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

csb5 SAPROS / LARS / DADO / JTA etc

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

csb6 Community

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

6i. Whose advise would you respect most regarding the use of chemical fertiliser
(Write down the social referent mentioned without prompting the subject)

---

4. Cutting legumes when harvesting

4a. Could you indicate if you have or have not carried out any of the following actions regularly over the past year:

(Read the different actions in turn and tick the box that indicates their response to each.)

	Cutting the following legumes when harvesting	Yes (+1)	No (-1)
Lbx1	Have grown legumes		
Lbx2	Have grown legumes as a crop in the fields		
Lbx3	Cut all the legume crops when harvesting		
Lbx4	Grow legumes only on bunds / terrace risers		
Lbx5	Cut only legumes that are difficult to pull		
Lbx6	Cut only legumes that are easy to cut		

Intention

4b. How strongly do you intend to cut all legumes during your next harvest?

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Attitude

4c. How good or bad is it to cut all legumes during your next harvest?

Very good	Good	No opinion	Bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Beliefs

(Read the following introduction and the each statement in turn ticking the response to each on the two scales which correspond to questions 4d. and 4e)

The words I am about to read are what other farmers are saying about cutting legumes when harvesting them.

4d. In your opinion are the following statements true or not?

4e. Could you indicate how good or bad the outcomes each of these statements are?

L1 Clean grain production (cleaner product without soil and stone)

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

L2 Cutting will result in good soil (soft)

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

L3 It will be more difficult to harvest

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

L4 Will provide feed for livestock

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

L5 Makes harvesting easier

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

L6 Cutting will increase the soil fertility

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

L7 Will not loosen the soil

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

L8 Will make no difference

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Subjective Norm

4f. How likely is it that the people **who you respect most** would think you should cut legumes in your next harvest?

Very likely	Likely	Don't know	unlikely	Very unlikely
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Motivation

4g. How motivated would you be to follow the advice of the following regarding cutting legumes in your next harvest?

Lsm1 Family

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Lsm2 Neighbours

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Lsm3 Community

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Lsm4 LARS etc

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Normative beliefs

4h. Indicate how strongly the following would agree with you cutting legumes in your next harvest?

Lsb1 Family

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Lsb2 Neighbours

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Lsb3 Community

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Lsb4 LARS etc

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

4i. Whose advise would you respect most regarding the harvesting of legumes?
(Write down the social referent mentioned without prompting the subject)

_____

5. Planting hedgerows

5a. Could you indicate if you have or have not carried out any of the following actions regularly over the past 3 years:

(Read the different actions in turn and tick the box that indicates their response to each.)

	Planting hedgerows in the past 3 years	**Yes (+1)**	**No (-1)**
Hbx1	Have you planted hedgerows on your farm		
Hbx2	Have you got several hedgerows		
Hbx3	Have you used more than one species in your hedgerows		
Hbx4	Have you included leguminous species in your hedgerows		
Hbx5	Do you cut your hedgerows regularly		

Intention

5b. How strongly do you intend to plant hedgerows in the next year on your farm?

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Attitude

5c. How good or bad is it to plant hedgerows on your farm in the next year?

Very good	Good	No opinion	Bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Beliefs

(Read the following introduction and the each statement in turn ticking the response to each on the two scales which correspond to questions 5d. and 5e)

The words I am about to read are what other farmers are saying about planting hedgerows on their farms.

5d. In your opinion are the following statements true or not?

5e. Could you indicate how good or bad the outcomes each of these statements are?

h1 Will help in holding the soil (prevent soil loss)

Very true	True	Don't know	False	Very False
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Very good	Good	No opinion	bad	Very Bad
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

h2 Roots will occupy some space in the field

Very true	True	Don't know	False	Very False
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Very good	Good	No opinion	bad	Very Bad
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

h3 Roots will make ploughing difficult

Very true	True	Don't know	False	Very False
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Very good	Good	No opinion	bad	Very Bad
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

h4 Will provide fodder / forage

Very true	True	Don't know	False	Very False
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Very good	Good	No opinion	bad	Very Bad
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

h5 Hedgerow leaf litter will provide mul

Very true	True	Don't know	False	Very False
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Very good	Good	No opinion	bad	Very Bad
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

h6 Will provide fuel wood

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

h7 Roots will increase soil fertility

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

h8 Hedgerows will provide multiple benefits?

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

h9 No seedlings available

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Subjective Norm

5f. How likely is it that the people **who you respect most** would think you should plant hedgerows on your farm in the next year?

Very likely	Likely	Don't know	unlikely	Very unlikely
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Motivation

5g. How motivated would you be to follow the advice of the following regarding planting hedgerows on your farm in the next year?

Hsm1 Family

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Hsm2 Community (Neighbours)

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Hsm3 ICIMOD / NARC /LARS etc

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Normative beliefs

5h. Indicate how strongly the following would agree or disagree with you planting hedgerows on your farm during the next year.

Hsb1 Family

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Hsb2 Community (Neighbours)

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Hsb3 ICIMOD / NARC /LARS etc

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

5i. Whose advise would you respect most regarding the planting of hedgerows?
(Write down the social referent mentioned without prompting the subject)

_____

6. Keeping animals in stalls

6a. Could you indicate if you have or have not carried out any of the following actions regularly over the past year:

(Read the different actions in turn and tick the box that indicates their response to each.)

	Keeping animals in stalls	Yes (+1)	No (-1)
Sbx1	Did you keep your animals in stalls all year		
Sbx2	Did you use a semi-stall feed system with controlled grazing		
Sbx3	Did you keep your animals in temporary sheds in the field in winter		

Intention

6b. How strongly do you intend to keep your animals in stalls next year?

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Attitude

6c. How good or bad is it to keep your animals in stalls next year?

Very good	Good	No opinion	Bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Beliefs

(Read the following introduction and the each statement in turn ticking the response to each on the two scales which correspond to questions 6d. and 6e)

The words I am about to read are what other farmers are saying about keeping animals in stalls.

6d. In your opinion are the following statements true or not?

6e. Could you indicate how good or bad the outcomes each of these statements are?

s1 Will protect livestock against wild animals

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

s2 Will not have enough fodder to feed the animals

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

S3 More mul will be produced

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

S4 Mul will decompose better due to animal urine being mixed with it

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

S5 It will reduce crop damage

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

S6 Animals will get better care

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

S7 Lead to increased work load (labour)

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

S8 Will have to depend on forest for additional fodder

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

S9 Animals will be healthier

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

S10 All animals need to be grazed sometimes (exercised)

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Subjective Norm

6f. How likely is it that the people **who you respect most** would think you should keep your animals in stalls next year?

Very likely	Likely	Don't know	unlikely	Very unlikely
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Motivation

6g. How motivated would you be to follow the advice of the following regarding keeping your animals in stalls during next year?

Ssm1 Family

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Ssm2 Community

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Ssm3 ICIMOD / NARC /LARS etc

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Ssm4 Neighbours

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Normative beliefs

6h. Indicate how strongly the following would agree or disagree with you keeping your animals in stalls during next year?

Ssb1 Family

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Ssb2 Community (Neighbours)

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Ssb3 ICIMOD / NARC /LARS etc

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Ssm4 Neighbours

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

6i. Whose advise would you respect most regarding keeping your animals in stalls during the next year?

(Write down the social referent mentioned without prompting the subject)

7. Planted fodder trees

7a. Could you indicate if you have or have not carried out any of the following actions regularly over the past 3 years:

(Read the different actions in turn and tick the box that indicates their response to each.)

	Planting fodder trees in the past 3 years	Yes (+1)	No (-1)
tbx1	Planted fodder trees on your farm		
tbx2	Have you received seedlings (given)		
tbx3	Have you purchased seedlings		
tbx4	Participated in forest user group		

Intention

7b. How strongly do you intend to plant fodder trees in the next year on your farm?

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Attitude

7c. How good or bad is it to plant fodder trees on your farm in the next year?

Very good	Good	No opinion	Bad	Very Bad
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Beliefs

(Read the following introduction and the each statement in turn ticking the response to each on the two scales which correspond to questions 7d. and 7e)

The words I am about to read are what other farmers are saying about planting fodder trees on their farms.

7d. In your opinion are the following statements true or not?

7e. Could you indicate how good or bad the outcomes each of these statements are?

T1 Will help to hold the soil (prevent soil loss)

Very true	True	Don't know	False	Very False
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Very good	Good	No opinion	bad	Very Bad
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

T2 The shade will be a problem for other crops

Very true	True	Don't know	False	Very False
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

Very good	Good	No opinion	bad	Very Bad
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

T3 Will provide fodder for livestock

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

T4 Will add nutrients to the soil via their leaf litter

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

T5 Lack of village co-operation will make it difficult to plant trees

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

T6 Increased fuel wood supply

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

T7 It will be difficult to find seedlings

Very true	True	Don't know	False	Very False
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Very good	Good	No opinion	bad	Very Bad
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Subjective Norm

7f. How likely is it that the people **who you respect most** would think you should plant fodder trees on your farm in the next year?

Very likely	Likely	Don't know	unlikely	Very unlikely
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Motivation

7g. How motivated would you be to follow the advice of the following regarding planting fodder trees on your farm in the next year?

Tsm1 Family

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Tsm2 Community (Neighbours)

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Tsm3 NARC /LARS etc

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Tsm4 Community forestry group

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Normative beliefs

7h. Indicate how strongly the following would agree or disagree with you planting fodder trees on your farm during the next year?

Tsb1 Family

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Tsb2 Community (Neighbours)

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Tsb3 NARC /LARS etc

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	*(+1)*	*(0)*	*(-1)*	*(-2)*

Tsb4 Community forestry group

Very strongly	Strongly	Undecided	Weak	Very Weak
(+2)	***(+1)***	***(0)***	***(-1)***	***(-2)***

7i. Whose advise would you respect most regarding the planting of fodder trees?
(Write down the social referent mentioned without prompting the subject)

_____

'Remember to thank the farmer for his/her time and valuable information'