

Successful NTFP commercialisation  
*A quantitative analysis based on household and trader level  
data*

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## Summary reference table

Hypothesis	Findings on basis of household and trader surveys
<i>Hypothesis 1, question 1.2</i> Are the same individuals involved in production (wild collection and cultivation), processing and trade?	Sometimes households are involved in more than one stage; households are similar across stage, however traders are more developed than households.
<i>Hypothesis 1, question 1.3</i> What is the level of poverty of those involved in NTFP extraction – is it true that it is the poorest that are most involved, and what share of income do they derive from NTFP trade?	Few are really poor (e.g. Palma Camedora); NTFP households are poorer than controls in Bolivia, but not in Mexico; a third of households in Bolivia depend on NTFP activities for more than half their income, this is a sixth in Mexico. NTFP households are ranked amongst the bottom rankings in 5 communities (Potrero, Latuvi, Cuajimoloyas, Tiltepec, Arroyo Blanco), but amongst the top rankings in only 2 communities (Agua Pescadito) and amongst the middle rankings in 2 other communities (Tomachi and El Carmen Surutu). NTFP households are neither only wealthy (see Pucasucho) nor only poor (see Arroyo Blanco).
<i>Hypothesis 1, question 1.4</i> Do people engage in NTFP extraction because they are poor or are they poor because they are dependent on extraction for their livelihoods?	In Mexico NTFP households and controls are equally poor, and the poorest households do not want to continue NTFP trade (hence NTFP activity out of necessity). In Bolivia, NTFP traders are poorest, and those that are poor are most likely to want to move into selling other products rather than move into another stage. This also indicates that the poorest engage in NTFP activity out of necessity (NTFP covers a larger share of income in Bolivia).
<i>Hypothesis 1, question 1.5</i> Do NTFP extraction activities primarily make up shortfalls in income or do they provide a path to socio-economic advancement? In other words, are they alleviating poverty or just providing a means of survival?	Shortfalls in some case, but important in livelihood strategy (e.g. Hongos, Pita, Palma and Cacao). Some products play a very important role in providing income. On the basis of the effect of agriculture subsidies in Mexico it is likely that NTFP income is not simply a substitute for other activities. NTFP activity is a useful activity that can generate cash income, and if households have the opportunity to be involved in agriculture or NTFP they would do both as opposed to concentrating on one activity in particular.
<i>Hypothesis 2, question 2.1</i> To what extent are women involved in harvesting, transporting, processing and marketing the NTFP?	Gender differences relate to collection (more males) and processing (females more likely); see Cacao, Jipi Japa, Brahea Palma soyate) and Palma Camedora.
<i>Hypothesis 2, question 2.4</i> Is women's social, political and economic status being helped or harmed by NTFP commercialisation?	Insufficient data in database.
<i>Hypothesis 3, question 3.2</i> Is there evidence of resource depletion? What are social, economic or biological causes of any depletion observed?	Collection time differs across products; no correlation (changes in) time and success
<i>Hypothesis 3, question 3.3</i> Is there evidence of harvesting moving to different areas in response to depletion?	No relationship past trade and (changes in) time
<i>Hypothesis 3, question 3.5</i> Is there a relationship between biological characteristics of the NTFP and whether increased NTFP trade leads to domestication?	Insufficient data in database.
<i>Hypothesis 3, question 3.7</i> Is there a relationship between poverty indices and domestication vs distance to resource?	
<i>Hypothesis 5, question 5.1</i> Does the successful commercialisation of an NTFP depend critically on the existence of an accessible market?	The average NTFP value added by households involved in Brahea dulcis (Palma soyate) selling to intermediaries is more than those selling locally. However, the reverse seems true for Jipi Japa and Palma Tepejilote, while there is no real difference for Goma households. So strictly speaking, an “accessible market” where consumers are present is not required for Brahea and Goma, but it would help sales in the case of Jipi Japa and Palma Tepejilote. For instance, in the case of Jipi Japa, households living in El Carmen Surutu make much less by selling to intermediaries than to local consumers so for these households an accessible market seems important.
<i>Hypothesis 5, question 5.2</i> Does the successful commercialisation of an NTFP depend critically on potential demand?	Success not correlated with increases in past trade, but positive correlation with expected demand. Reports show that certain mushrooms (Hongos Blanco - Latuvi) are exported to Japan, while Incense is being exported to Argentina. The commercialisation of these two products seems to be successful, more so compared to their peers (dried mushrooms and copal). Finding market niches seems key. But the question as to whether any NTFP can create its own market is much more complex and needs analysis at product level and goes beyond household level analysis.
<i>Hypothesis 5, question 5.5</i> Does the successful commercialisation of an NTFP depend critically on access by producers, processors and traders to market information?	The database for households shows that access to a sellers' organisation is not essential to success. With regard to access to a transformation/processing organisation, percentages of households are 7% (Brahea), 24% (Cacao Silvestre), 100%

	(Jipi Japa) and 86% (Pita). For Cacao, those with access to a transformation organisation are mostly based in San Silvestre, whose value added per household is lower than in Carmen del Emero, the other community involved in Cacao. Those in San Silvestre do more processing than those in Carmen del Emero, who seem to supply a large plant. Within San Silvestre, those that had access to the organisation had an annual value added of 93 USD (PPP) per household against 81 USD (PPP) for those that do not. So this is potentially important. Other evidence shows that NTFP value added is significantly lower for those households in Bolivia that perceive that knowledge of the market is an obstacle, so successful commercialisation depends statistically on market information. While value added is also lower for households reporting that the other variables constitute barriers to further commercialisation, this is not statistically significant.
<i>Hypothesis 5, question 5.9</i> Does the successful commercialisation of an NTFP depend critically on trader characteristics (age, experience, education, etc)?	Individual/household effects are likely to be important in determining the value of sales and thus possibly successful commercialisation. Most variation in household performance seems to be due to variation in the quantity sold rather than the unit value charged. The following characteristics matter (but other can matter too): <ul style="list-style-type: none"> <li>• Positive correlation (male) age and success for Cacao, but negative for Pita</li> <li>• Positive correlation education and share of income for Brahea dulcis (Palma soyate)</li> <li>• Positive correlation access to credit and success for Palma Camedora</li> </ul>
<i>Hypothesis 6, question 6.7</i> Is there monopolization (e.g. of transport, information) at various NTFP stages and how does this affect success at previous stages?	A single or handful of buyer may be able to charge a single and low price. For instance, it appears that (appendix G) prices are set at some fixed level for Hongos in Cuajimoloyas, Palma Camedora and Palma Tepejilote in Yagavila, suggesting that households have little influence over the price. These products are also amongst the weakest in terms of revenue generation. For other products such as Cacao Silvestre, Hongos in Latuvi and Maguey it appears that quantity and price interact. As expected, the higher the unit value the fewer products can be sold. These products do relatively well in terms of generating money.
<i>Hypothesis 6, question 6.8</i> Is there a lack of access to credit, transportation, information on price fluctuations, storage facilities?	Main barriers to entry in Mexico include: Knowledge of and contacts in the market, access to finance and lack of information more generally. Similar barriers are faced by traders in Bolivia, but in addition, lack of appropriate infrastructure and the family situation impede access to selling NTFPs. Most barriers are present to a larger extent in Bolivia, though lack of knowledge of market is (relatively) more important in Mexico. Lack of knowledge of market and lack of contacts may suggest that there is not sufficient demand to sell products easily. Very often either all households or none have access to credit within communities. For instance, the Jipi Japa communities are extremes. All households in Buenavista (with the highest income in the Jipi Japa communities) have access to credit, while non has in El Carmen Surutu (lowest income).
<i>Hypothesis 6, question 6.10</i> Do state (or non-state) institutions play a role in marketing?	Difficult to establish

## **1 Introduction**

This paper discusses factors that influence successful commercialisation of non-timber forest products (NTFPs) on the basis of household and trader surveys. These surveys have been conducted in 2002-2003 by local collaborators in Bolivia and Mexico as part of a three year UNEP-WCMC and ODI project. The project consists of various parts tied together by a common set of hypotheses and subquestions. The various types of analyses include (i) text analysis on the basis of product reports of individual NTFPs and community report of communities present in the sample (ii) value-chain analysis on the basis of interviews with stakeholders and NTFP traders at various stages of commercialisation of the product and (iii) statistical analysis on the basis of household level and trader level information.

The aim of the present paper is to use the third type of analysis, statistical analysis, to inform the hypotheses and subquestions. It is hoped that this will ultimately lead to a decision-making tool that can inform relevant stakeholders on what determines successful commercialisation. Hence, the approach taken in this paper is to validate or inform hypotheses and sub-questions and where possible link back to what is known on the basis of existing literature on NTFP commercialisation. In this way, the analysis will describe whether the project hypotheses do apply to the communities, something that to our knowledge has not yet been tested, and whether the existing literature on NTFP commercialisation needs refinement. The extent to which refinement of the literature is appropriate may depend on the recommendation domain of our findings. Findings may be extrapolated only under certain conditions.

The structure of this paper is as follows. Section 2 will provide an overview of the sample data. Section 3 provides a list of the main hypotheses to be tested in this paper. The motivation of these hypotheses and their basis in the literature are discussed elsewhere. Section 4 provides a brief introduction into the techniques employed, including regression analysis. Section 5 discusses the empirical results on the basis of the hypotheses and their subquestions. The results are presented in the appendix. Section 6 concludes.

## 2 Sample data

This section discusses the sample data, contained in a STATA file, used to perform the analysis in the rest of the paper. Interviews were conducted during late 2002 and early 2003. In total there were 452 interviews processed into database format. Table 1 provides a simple breakdown of the interviews. There were 238 interviews in Bolivia and 214 in Mexico; 289 interviews were with households involved in NTFP activities and 46 with NTFP traders, while 91 interviews were conducted with controls for NTFP households and 26 with controls for NTFP traders.

**Table 1 Breakdown of number of surveys**

	Involved in NTFP activities		Controls		<i>Total</i>
	Households	Traders	Households	Traders	
Bolivia	142	25	46	25	238
Mexico	147	21	45	1	214
<i>Total</i>	289	46	91	26	452

Households (and traders) involved in NTFP activities belong to one of 18 communities and are considered to be involved in one of 11 products. Table 2 provides information on the size of the sample survey below for NTFP households and their controls. When there are only few NTFP households in a community, the surveys aimed to cover all or most of them (see e.g. Goma in Santa Rosa); however when there were many NTFP households in a community, the surveys aimed to cover around 20<sup>1</sup> (see Cacao, Carmen del Emero). Controls were chosen such that they were similar to NTFP households, but of course the main difference being that they were not involved in NTFP trade.

Based on the answers to the household surveys we can distinguish between different stages of NTFP activity. The questionnaire asks whether a household performs one of 6 activities. We divide these into five different stages as follows, ensuring a household can be allocated to one stage only.

### **Box 1 Definition of unique stage for each household**

Stage 1 = production (i.e. cultivation) Stage 2 = collection not production Stage 3 = processing, not production and not collection Stage 4 = other, household (including traders inside village) Stage 5 = traders (outside village)
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While this ensures that households are involved in one stage, it could be that they are involved in more than one activity as can be seen by the following data.

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<sup>1</sup> Cochran (1977, p.75-76) discusses the required size of sample size consistent with the amount of error that we are willing to tolerate in the sample estimates. Suppose we are interested in saying that a proportion estimated should at 90% confidence level lie within 0.15 of the real value, then an initial estimate of the required sample size would be around 30 (independent of the total population size). If for instance we have information about the size of the population, say 100, then the required sample size would be close to 20 (23).

Total observations (Bolivia and Mexico) with info on stage:266

count if hprod==1	62
count if hcollect==1	173
count if hprocess==1	130
count if hprod==1&hcollect==1	32
count if hcollect==1&hprocess==1	60
count if hprod==1&hcollect==1&hprocess==1	12

**Table 2 Sample size and size of communities (household level surveys)**

Product	Community	Within the community		NTPF Hhd surveys in database and used for analysis	Control surveys in database and used for analysis
		Total hhds	NTPF hhds		
Goma	Santa Rosa	26	21	25	-
Goma	Tomachi	140	15	13	5
Cacao	San Silvestre	22	22	14	3
Cacao	Carmen del Emero	47	47	23	-
Incienso	Pucasucho	45	31	17	6
Copal	Pucasucho	45	36	6	-
Jipi Japa	Carmen Surutu	120	23	13	10
	Potrero	33	15	7	8
	Candelaria + Buenavista	40	25	23	3
Palma tepejilote	Tiltepec	35	20	15	7
Palma tepejilote	Yagavila	110	8	6	2
Palma Camedora	Monte Tinta	108		24	8
Hongos	Cuajimoloyas	147	13	13	5
Hongos	Latuvi	101	20	13	4
Pita	Arroyo Blanco	130	70	22	6
Pita	S. R. Agua Pescadito	171	6	6	10
Brahea dulcis (Palma soyate)	La Esperanza	246	246	16	-
Brahea dulcis (Palma soyate)	Topiltepec	379	360	20	1
Maguey	La Esperanza			3	-
Maguey	Topiltepec			9	-
Unallocated to above list of community & product					13 (of which 7 to Cacao)
<i>Total household surveys</i>				289	91

Source: project workshop

Nevertheless there are clear interpretations: for instance, in stage 1 a household is involved in production and possibly other activities, while in stage 2 a household is not involved in production, but in collection and possibly other activities. Differences in characteristics between households in stage 1 and 2 could be related to whether a household is involved in production or not. A breakdown of the number of interviews by stage is shown in table 3. The interviews were not structured around different stages. In Bolivia, there are no stage 4 actors, i.e. there are no community based traders that are not involved in processing.

**Table 3 Interviews of households and traders by stage**

	Bolivia	Mexico	Total
Stage 1 Production	13	49	62
Stage 2 Collection (not production)	93	48	141
Stage 3 Processing (not stage 1 or 2)	35	8	43
Stage 4 Otherwise	-	20	20
Stage 5 Trader (outside community)	25	21	46
Total above	166	146	316
Not identified or control	72	72	140
Total	238	218	456

### 3 Hypotheses tested

This paper is part of a larger project which has 6 key research hypotheses based on the literature:

1. Changes in trade in NTFPs have a greater impact on the poorest producers, processors and traders.
2. Changes in trade in NTFPs have a greater impact on women's livelihoods.
3. Increase in the volume of NTFP trade leads to forest overexploitation and/or domestication.
4. Changes in the volume of NTFP trade lead to reduced rights/access to the resource for the poorest producers.
5. The successful commercialisation of an NTFP depends critically on the existence of an accessible market, potential demand, and the access by producers, processors and traders to market information.
6. The number of demanders and suppliers, the exertion of market power, barriers to entry, and the degree of vertical and horizontal integration determine how competitively poor producers, processors and traders can participate in NTFP commercialisation.

Appendix B provides a breakdown of these key hypotheses into subquestions<sup>2</sup>. There are various types of analyses, and the analysis performed in this paper on the basis of household and trader surveys can provide insight into only a selection of the list of subquestions.

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<sup>2</sup> Note that the exact wording of the hypotheses and subquestions continued to evolve during the course of the project. This paper uses the wording correct at time of writing.

## 4 Methodology and techniques used

This section discusses the methodology used to test the hypotheses. In particular it will provide a brief explanation of the econometric tools used. The methodologies are applied in the statistical package, STATA, hence some of the main commands will also be given.

### *Tables, F-tests, p-values and Charts*

The use of tables is a simple tool to test hypotheses. For instance, a table can provide means of variables across all households involved in trading a particular product (use *tabulate* in STATA). It is also possible to test for differences in mean amongst groups, for instance to test whether the mean income differs by stage. For this we need to use the *oneway* command in STATA, and the p-value for the F-test indicates whether there is more variation in mean income across groups than variation within groups. Finally, charts are also useful to bring out salient findings.

### *Regression analysis (ordered logit)*

While the tabulations are informative and relatively straightforward to construct, they do not allow for the influence and interdependence of multiple factors or for explaining continuous variables such as the profit measure (first) of success. For this, we should use regression analysis. A regression analysis shows the relationship between a key response of interest and one or more explanatory variables. For instance, it can tell to what extent a particular selling strategy (e.g. selling to intermediaries) or access to finance is associated with being successful in NTFP commercialisation.

For a regression analysis it is useful to define first a dependent variable  $y$  as the measure of success. This variable to be explained can be quantitative or qualitative (e.g. an ordered index variable), and depending on this, particular estimation procedures are most appropriate (OLS for continuous dependent variables, logit estimation if the dependent variable is a 0/1 dummy and ordered logit estimations if the dependent variable is discrete but ordered (ranked) – use STATA command *ologit*). We then need to define explanatory variables of success as  $N$ -variables  $x_1, \dots, x_N$  based on the characteristics of individuals (e.g. skills – education and experience; or having contacts beyond community level) and other (from where do you obtain information on marketing opportunities, selling strategies, marketing conditions, etc.). Generally speaking we have the following relationship:

$$y = f(x_1, \dots, x_N)$$

By measuring each variable for a number ( $K$ ) of individuals,  $i=1, \dots, I$  We can then use regression analysis to assess the significance of each of these variables in determining success:

$$y_i = \alpha + \beta_1 x_{1i} + \dots + \beta_N x_{Ni} + \varepsilon_i$$

where  $\alpha$  is a constant and the  $\beta$ 's are parameters of interest and  $\varepsilon$  an error. We need to determine which explanatory variables are included and collected.

The literature suggests that many factors are potentially important. Such factors have also been identified in case study product and community reports discussed elsewhere in the

project<sup>3</sup>. Some of these factors are relevant for answering the hypotheses concerning successful NTFP commercialisation. They may include the following explanatory variables (and are discussed elsewhere):

- Level of education, access to land, access to finance
- Place of transaction (categories)
- Selling strategies (categories)
- Type of market (many buyers/sellers etc.)
- Expectation (average) in development of demand for NTFP, etc.

It is possible to use information from at least two dimensions: communities and products, although in the analysis we will use product information since this is closely linked to the community (and hence it will be difficult to identify separate effects). Suppose there are  $j=1, \dots, J$  communities and  $k=1, \dots, K$  NTF products. Then we define  $y_{ijk}$  as a measure of success by individual  $i$  in community  $j$  with product  $k$ . The explanatory variables can be indexed similarly. We can then estimate a panel (regression over more than one dimension) of observations

$$y_{ijk} = \alpha + \beta_1 x_{1ijk} + \dots + \beta_N x_{Njki} + \varepsilon_{ijk}$$

and if needed we can let the parameters of interest vary by community. It is also easy to incorporate separate effects for community (18 rows of data) and/or products (11 bits of data) through the inclusion of dummy variables. That is, individuals with certain characteristics can be successful with one product, or in one community, but not with other products, or in other communities. If such dummies are significant, this implies that there are unobserved effects affecting success. It is of course more desirable to include product specific variables than explain such “unobserved effects”. It will also be desirable to test down for which factors are significant.

Finally, it may be important to disaggregate relationships to the product level, as it has often been suggested that all NTFPs are not the same. In fact, each individual NTFP could be regarded as one of many non-farm rural products, each with their own characteristics. In fact a lot of the analysis will actually be done at product and community level.

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<sup>3</sup> For the analysis of the community reports see: **Marshall, E. 2005**. Analysis of case study communities from community level reports written by research partners in Bolivia and Mexico. CEPFOR report. For the analysis of the product reports see: **Rushton, J., Pérez, L. and Viscarra, C. 2004**. Value chains for a range of non-timber forest products in Bolivia and Mexico. CEPFOR report.

## 5 Results

This section discusses the empirical results as presented by the tables and charts in the appendix. After a general introduction we will discuss the findings of applying our methodologies to the data on the basis of subquestions. We hope to provide new insights that may help to answer these subquestions.

### 5.1 *Definition and measurement of success*

An important unit of analysis is the level of success. If this can be measured, then we can define successful commercialisation. Box 2 lists various definitions of successful commercialisation. There are advantages and disadvantages to each definition. Some definitions can easily be measured (subjective questions), while lack of suitable data impedes proper measuring of other definitions (profit measures). Some may be endogenous for success. Some are subjective while others are not. Tables A1-A3 provide an overview of how households answered the subjective questions of success. Appendix C provides a detailed discussion on the reliability of income data (including purchasing power parities estimates) used in this paper, and how income data had to be cleaned for irregularities that became apparent during workshops. It also suggests that data on incomes are much better documented than data on costs involved in NTFP activities.

#### **Box 2 Definitions of successful commercialisation**

We use various data from the household/trader level database to obtain indicators of success at household/trader level and at community/product level

Success at household/trader level can be defined as

- Level of income for those involved in NTFP (question 6.1)
- Share of income derived from NTFP (e.g. question 6.2 or calculated more precisely on basis of 6.1 and total NTFP sales in question 5)
- How important have NTFPs been in your livelihood strategy (question 6.7)
- How successful do regard yourself (question 6.6, three possible answers – not meeting basic needs, meeting basic needs, more than meeting basic needs)
- How successful do you consider yourself compared against your peers (question 6.5)
- Labour returns ( = total sales / hours to collect \* frequency of such trips )
- Profit margins at each stage. Total revenues minus total costs at each stage.

Apart from what community reports suggest, success at community level could be identified by the average of such variables over all households within a community.

See appendix H for correlations between measures of success for NTFP households

### 5.2 *Quantitative product and community level indicators*

Before we discuss the results by hypothesis at the household and trader level, it may be useful to gain insight into how mean income and other variables vary by product and/or

communities. Some of these would be related to measuring success at community or product level. Tables A4-A6 present the mean of characteristics such as having electrical lighting and the type of house.

We can also compare the mean income of all households involved in say Brahea dulcis with that of all households involved in say Palma camedora. Chart A1 shows that there are indeed substantial differences in mean income (per household) across products. The variability across products is smaller in Bolivia than in Mexico. Mean income for households involved in Palma camedora is less than a dollar a day, while that for Brahea households more than US\$ 8. The bottom two graphs of chart A1 relate to per capita income and hence account for the household size. They also split some products by community.

Chart A2 shows a similar comparison for the mean share of NTFP in total income derived from NTFP activities. The share is codified as

Share = 1 if NTFP income share is between 0-25%  
= 2 if NTFP income share is between 26-50%  
= 3 if NTFP income share is between 51-75%  
= 4 if NTFP income share is between 76-100%

The mean share varies considerably. It is striking that the mean share is higher in Bolivia than in Mexico. Chart A3 provides a further breakdown by product/community and uses estimated share data. Table A7 elaborates on results in table A2. It shows the percentages of households deriving selected percentages of their income from NTFP trade. On average, a third of households in Bolivia depend on NTFP trade for more than half of their income, while only a sixth of households in Mexico depend on NTFP trade for more than half of their income. Charts A10-12 clearly show a pattern that poor households depend on NTFP for a large share of their income, while higher incomes are in general associated with lower NTFP income shares. However, it should be noted that this appears to conceal clusters of product specific households.

Chart A4 shows the mean of answers to questions on how successful households think they are compared to their peers (codified as 1 if less successful, 2 if the same, and 3 if more successful) and how important NTFPs have been in the past in terms of their livelihood strategy (similar codification). The mean for most products is around 2, which should be the case when taking the mean. There can of course be significant variations across households and that is what we are interested in in this paper. Finally, Chart A5 provides mean household income by community.

Indeed, while there are substantial differences in various indicators across communities and products, Appendix E provides a preliminary discussion of the extent of variation in NTFP derived income that is due to the products households trade, due to the communities they live in or due to variability of individual households, or because of some combination of these factors. The main conclusion from that analysis is that there is great variety in productivity across households, even within products and/or communities. This motivates examining the research questions at an individual level.

### 5.3 Results by subquestion

#### *Hypothesis 1, question 1.2*

Are the same individuals involved in production (wild collection and cultivation), processing and trade?

Household level data can answer these questions in two ways. First, we can ask whether households are involved in more than one activity. This may indeed be the case

Total observations (Bolivia and Mexico) with info on stage:266

count if hprod==1	62
count if hcollect==1	173
count if hprocess==1	130
count if hprod==1&hcollect==1	32
count if hcollect==1&hprocess==1	60
count if hprod==1&hcollect==1&hprocess==1	12

Many households are involved in collection and some form of processing, but few households do more than one activity. For instance, there are 12 out of 266 households that are involved in production, collection and processing.

We can also ask whether households and traders vary in terms of characteristics across the various stages. We find that

- There appear to be differences between traders and households. Income, access to credit and level of education is higher / more developed for traders than for non-traders in both Bolivia and Mexico (chart A6-A9)
- There appear to be only minor differences in characteristics between various stages at household level: Average income does not vary by stage in the chain for households (except when all observations are pooled together), table A9. The same applies to education when taken at a country level. This is somewhat surprising since it is generally understood that processors need more skills and thus education than collectors. Indeed, examining levels of education at product level shows that higher levels of education are correlated with processing and production/cultivation as opposed to collecting (table A8).
- The share of income derived from NTFP activity varies by product but not really by stage in the chain for households (except when all observations are pooled together), table A10. Tables A12 and A13 further show that level of success or importance in livelihood strategy does not differ significantly across stages.

#### *Hypothesis 1, question 1.3*

What is the level of poverty of those involved in NTFP extraction – is it true that it is the poorest that are most involved, and what share of income do they derive from NTFP trade?

We have calculated the level of income and the share of income derived from NTFP by product and by community. The findings are as follows

- Households involved in Palma camedora (Mexico, mean income less than a dollar a day) and Jipi Japa (Bolivia, around two dollars a day) are particularly poor, whatever the stage of NTFP activity (Table A9).
- Households involved in Palma camedora (Mexico), Pita (Mexico), Cacao (Bolivia) and Hongos Mexico) derive a modest share from NTFP trade, while Copal, Incense and Jipi Japa (Bolivia) and Brahea (Mexico) are amongst the top contributors (Table A10).
- A third of households in Bolivia depend on NTFP trade for more than half of their income. This is only a sixth in Mexico (for a few products shares are based on cash income only, but appendix C corrects for this). More than a third of all the households in Candelaria, El Carmen Surutu, La Esperanza, Portrero San Rafael, Pucasucho, Santa Rosa, Tomachi and Topiltepec depend on NTFP for more than half of their annual income (Table A7 and A10).
- Charts A10-A12 show the relationship between income and share. There is a group of households with a high share and low income, and one with a low share and higher incomes. In part this is product specific.

Appendix D discusses the location of NTFP households in wealth rankings. It finds that

- NTFP households are ranked amongst the bottom rankings in 5 communities (Potrero, Latuvi, Cuajimoloyas, Tiltepec, Arroyo Blanco), but amongst the top rankings in only 2 communities (Agua Pescadito) and amongst the middle rankings in 2 other communities (Tomachi and El Carmen Surutu).
- While NTFP households are relatively poor, there is variation amongst communities and it would need further work to see whether this is due to heterogeneity in products or communities. For instance, why are households involved in Incense/Copal relatively well off within their community: is this because of lack of other income opportunities or because the product requires skills and capital. Similarly, Pita households are amongst the top ranking in Agua Pescadito (however note low number of households) but bottom ranking in Arroyo Blanco.
- NTFP households are neither only wealthy (see large number of households in group 2 for Pucasucho) nor only poor (see large number of households in group 2 for Arroyo Blanco).

#### *Hypothesis 1, question 1.4*

Do people engage in NTFP extraction because they are poor or are they poor because they are dependent on extraction for their livelihoods?

To answer this question we need to compare characteristics of NTFP households and their controls, i.e. who decides to engage in NTFP activity. We also need to examine exit strategies or desire for other types of activities.

With respect to differences between controls and NTFP households (Tables A15-A19):

- NTFP traders/households tend to have the same level of education (Bolivia and Mexico) as their controls (who are not involved in NTFP trade); at product level, more education for controls of those involved in Cacao Silvestre, less for controls for

Incense and Pita; similarly, better access to credit for Jipi Japa traders than their controls, the reverse for Goma.

- With respect to income, NTFP households in Bolivia compare less favorably than their controls (no significant effect in Mexico) and with respect to access to credit, while NTFP households in Mexico compare more favorably. In particular, those involved in Cacao, and Palma Tepejilote are worse off than their controls (although not significantly so).

But this depends on whether those who are engaged in NTFP activities want to change into selling other products. We find that (Table A20):

- Households with higher annual incomes would like to continue with the same NTFP trade in Mexico; hence, poorer households want change.
- In Bolivia, richer and more successful households do not want to change to selling different products, but want to move to a different stage in the production chain; this may indicate a learning effect.
- In Mexico, households that derive only a small share of their income from NTFP trade, are more likely to want to continue the present NTFP trade as well as moving into other products. This may be explained by the fact that a small share in income from the NTFP is welcome but not sufficient.
- In Bolivia this is less clear; where there seems to be a product (i.e. month) effect. The more months a product can be traded the more likely it is that a household wants to continue this activity, and the less likely it is that the household wants to move into other products. Conversely, households involved in seasonal products may want to move into other products.
- In Mexico, households involved in processing are more content with their activity/stage than households that are not involved in collection, production or processing, such as transport.

Thus, in Mexico, NTFP households and controls are equally poor, and the poorest households do not want to continue NTFP trade (hence they are engaged in the NTFP activity out of necessity). In Bolivia, NTFP traders are poorer than their controls, and those that are poor are most likely to want to move into selling other products rather than move into another stage. This also indicates that the poorest engage in NTFP activity out of necessity (it covers a large share of income, particularly cash income).

#### *Hypothesis 1, question 1.5*

Do NTFP extraction activities primarily make up shortfalls in income or do they provide a path to socio-economic advancement? In other words, are they alleviating poverty or just providing a means of survival?

It is likely that some NTFPs make up shortfalls in income, while other NTFPs provide a path to socio-economic development. For instance, Hongos, Pita, Palma camedora, Palma tepjilote and Cacao all are traded on average less than half a year, and this is unlikely to provide a sufficient income for a whole year (Table A14). Indeed, the same products provide only a small share in total income (see charts A2-A3, table A7 and A10). However, chart A4 shows that these same products are considered to be important as part

of the livelihood strategy, suggesting that NTFPs play an important but limited role. It may be a first step out of poverty (most households earn more than a dollar a day), but a step made out of necessity for not being able to move into other products.

Other products constitute a significant share of household income. More than a third of all the households in Candelaria, El Carmen Surutu, La Esperanza, Portrero San Rafael, Pucasucho, Santa Rosa, Tomachi and Topiltepec depend on the case study NTFP activity for more than half of their annual income (Table A7)

Appendix F elaborates further on this. If NTFP activities are done out of necessity, a subsidy that promotes other types of activities would reduce interest in NTFP activities. This can be tested in the case of the Mexicans, who receive a number of subsidies (Procampo, Progresas, Semarnat) many of which are aimed at stimulating agricultural production. The conclusion of the appendix is that NTFP income is not simply a substitute for other activities. First, one would expect “controls “ not involved in NTFP trade but involved in agriculture to have higher subsidies, but there is insufficient evidence for this, see table 1 below. Second, there is a low and mostly positive correlation between subsidies and NTFP income (see final rows) at product level. Hence, on this basis lower subsidies do not lead to higher NTFP income, suggesting that NTFP income can be seen as additional to agriculture income and not as a substitute. It is just a useful activity that can generate cash income, and if households have the opportunity to be involved in agriculture or NTFP they would do both as opposed to concentrating on one activity in particular.

#### *Hypothesis 2, question 2.1*

To what extent are women involved in harvesting, processing, transport and marketing of the NTFP?

The NTFP traders: 16 were female and 27 were male. The household surveys show that gender differences in NTFP activities relate to collection (males more likely) and processing (females more likely). Less than a third of men are involved in processing, but more than half of women. Nearly three quarters of men are involved in collection, while this is less than half for women. Such differences are particularly noticeable for Cacao, Goma, Jipi Japa, Brahea and Palma camedora (see tables A21 and A22).

Only 2 per cent of all households in the database were only involved in transporting and this percentage is the same for men and women. Presumably, traders are all involved in transport, and 37% of traders in the database are women.

#### *Hypothesis 2, question 2.2*

To what extent do women have control over the means derived from NTFPs and to what extent do they benefit from their sale?

Hard to get reliable data on this from the database.

#### *Hypothesis 2, question 2.4*

Is women's social, political and economic status being helped or harmed by NTFP commercialisation?

It is difficult to examine this question on the basis of the present household data, as there are only 10 female only households.

*Hypothesis 3, question 3.2*

Is there evidence of resource depletion? What are social, economic or biological causes of any depletion observed?

Table A23 provides collection time and whether this (variable ‘timechange’) has increased (3), stayed the same (2) or decreased (1). It shows that

- Collection time varies by product, as do trends in collection time
- Copal and Incense take a long time to collect (days); cacao, goma and maguey a short time (an hour)
- Brahea and Palma camedora take increasingly more time to collect.

Table A24 shows that

- Using simple correlation techniques, collection time is not correlated with income or success; positive and negative signs.
- The exceptions are Brahea and Maguey, where richer households also spend more time on collection.

*Hypothesis 3, question 3.3*

Is there evidence of harvesting moving to different areas in response to depletion?

Household surveys indicate that developments in past trade do not seem positively related to increases in the collection time. In fact, from this evidence, there are certain products that face longer collection time (e.g. Brahea, and Palma camedora) independent of developments in past trade (table A25)

*Hypothesis 3, question 3.5*

Is there a relationship between biological characteristics of the NTFP and whether increased NTFP trade leads to domestication?

No data in this analysis, because we need product specific data.

*Hypothesis 3, question 3.7*

Is there a relationship between poverty indices and domestication vs distance to resource?

There appears not to be such a relationship, and if any, it would be negative. Table A24 shows that

- Using simple correlation techniques, collection time is not correlated with income or success; positive and negative signs.
- The exceptions are Brahea and Maguey, where richer households also spend more time on collection.

*Hypothesis 5, question 5.1*

Does the successful commercialisation of an NTFP depend critically on the existence of an accessible market?

Table A33 shows that the average value added in sales by households involved in Brahea dulcis selling to intermediaries is more than those selling locally. However, the reverse seems true for Jipi Japa and Palma tepejilote, while there is no real difference for Goma

households. So strictly speaking, an “accessible market” where consumers are present is not required for Brahea and Goma, but it would help sales in the case of Jipi Japa and Palma tepejilote. For instance, in the case of Jipi Japa, households living in El Carmen Surutu make much less by selling to intermediaries than by selling within their own or neighbouring communities so for these households an accessible market seems important.

*Hypothesis 5, question 5.2*

Does the successful commercialisation of an NTFP depend critically on potential demand?

This question will need some interpretation and has two parts. First successful commercialisation depends on there being an existing demand for the product; without it, products cannot be sold. But secondly, developing NTFP products could create new markets. Or individuals can create or find niches of market demand.

Reports show that certain mushrooms (Hongos Blanco - Latuvi) are exported to Japan, while Incense is being exported to Argentina. The commercialisation of these two products seems to be successful, more so compared to their peers (dried mushrooms and copal). Finding market niches seems key.

The question as to whether any NTFP can create its own market is much more complex and needs analysis at product level and goes beyond household level analysis.

*Hypothesis 5, question 5.5*

Does the successful commercialisation of an NTFP depend critically on access by producers, processors and traders to market information?

The database for households shows the following information: With regard to access to a sellers’ organisation, there is only 1 household in each of the cases Brahea dulcis, Cacao and Hongos. However, for Pita 79% (22 out of 28) of households have access to seller’s organisations. However, Pita is not above average successful.

With regard to access to a transformation/processing organisation, the numbers are 7% (Brahea), 24% (Cacao Silvestre), 100% (Jipi Japa) and 86% (Pita). For Cacao, those with access to a transformation organisation are mostly based in San Silvestre, whose value added per household is lower than in Carmen del Emero, the other community involved in Cacao. Those in San Silvestre do more processing than those in Carmen del Emero, who seem to supply a large plant. Within San Silvestre, those that had access to the organisation had a value added of 93 USD (PPP) per household against 81 USD (PPP) for those that do not. So this is potentially important, though there is the possibility of endogeneity that more successful actors join organizations.

Not surprisingly, none of the households had access to a buyers’ organisation.

Table A32 discusses barriers to entry to selling NTFPs. Such barriers include lack of product information, lack of market knowledge, and lack of contacts in the market. Table A34 shows that NTFP value added is significantly lower for those households in Bolivia that perceive that knowledge of the market is an obstacle, so successful

commercialisation depends statistically on market information. While value added is also lower for households reporting that the other variables constitute barriers to further commercialisation, this is not statistically significant.

#### *Hypothesis 5, question 5.9*

Does the successful commercialisation of an NTFP depend critically on trader characteristics (age, experience, education, etc)?

Charts E1 and E2 provide a clear indication that individual effects are likely to be important in determining the value of sales and thus possibly successful commercialisation. Appendix G shows that most variation in household performance seems to be due to variation in the quantity sold rather than the unit value charged.

The percentage variation in volumes is larger than that for unit value in the cases of Cacao, Hongos (within the separate communities) and particularly for Palma camedora, Palma tepejilote and Pita. It appears that the latter three are based on a single unit value. There is no clear cut interpretation for Incense, while price variation is stronger for Maguey.

Such descriptive data tell us that individual/household characteristics matter, but not why some households can sell more than others. The following characteristics matter:

- Positive correlation (male) age and success for Cacao, but negative for Pita
- Positive correlation education and share of income for Brahea dulcis
- Positive correlation access to credit and success for Palma camedora

This list is not exhaustive and further work can be done. But the main conclusion is that household characteristics are very important in influencing the degree to which NTFPs generate value added.

#### *Hypothesis 6, question 6.7*

Is there monopolization (eg of transport, information) at various NTFP stages and how does this affect success at previous stages?

One way in which monopolization can potentially affect success is that a single buyer may be able to charge a single and low price. For instance, it appears that (appendix G) prices are set at some fixed level for Hongos in Cuajimoloyas, Palma camedora and Palma tepejilote in Yagavila, suggesting that households have little influence over the price. These products are also amongst the weakest in terms of revenue generation. For other products such as Cacao silvestre, Hongos in Latuvi and Maguey it appears that quantity and price interact. As expected, the higher the unit value the fewer products can be sold. These products do relatively well in terms of generating money.

#### *Hypothesis 6, question 6.8*

Is there a lack of access to credit, transportation, information on price fluctuations, storage facilities?

Table A32 discusses obstacles to selling more NTFPs:

- Main barriers to entry in Mexico include: Knowledge of and contacts in the market, access to finance and lack of information more generally.

- Similar barriers are faced by traders in Bolivia, but in addition, lack of appropriate infrastructure and the family situation impede access to selling NTFPs.
- Most barriers are present to a larger extent in Bolivia, though lack of knowledge of market is (relatively) more important in Mexico.
- Lack of knowledge of market and lack of contacts may suggest that there is not sufficient demand to sell products easily, although in principle this could also be because of a co-ordination failure between supply and demand. If the latter is the case, better co-ordination and supply of information is required, while better infrastructure and credit facilities may also be required in order to encourage NTFP activities.

Table A31 discusses the extent to which households in communities have access to credit. Very often this is either all households, or none. For instance, the Jipi Japa communities are extremes. All households in Buenavista (with the highest income in the Jipi Japa communities) have access to credit, while none has in El Carmen Surutu (lowest income).

*Hypothesis 6, question 6.10*

Do state (or non-state) institutions play a role in marketing?

Not directly relevant for household based analysis.

## 6 Conclusions

The main results of the paper are summarised in the reference table at the beginning of the paper. This provides a discussion of how trade and household level data can provide insights into the hypotheses and subquestions raised in this paper. At the least, successful commercialisation depends on product level, community level and individual characteristics. We have analysed success at various levels including livelihoods, productivity and share of income, but it is impossible to look at profitability across households due to lack of household specific data. However, the latter will be picked up by an analysis based on averages in value chain analysis<sup>4</sup>.

While this paper has not been set up to address the general hypotheses (but provides detailed information on the sub-questions), the following general comments relating to each hypothesis may be useful.

1. Changes in trade in NTFPs have a greater impact on the poorest producers, processors and traders.

NTFP activities usually reach the poorer (but not the poorest) members of the community. NTFP activities are often done out of necessity, i.e. leading to poverty reduction, with a lack of alternative income generating activities. Some NTFPs are really

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<sup>4</sup> See **Rushton, J., Pérez, L. and Viscarra, C. 2004**. Value chains for a range of non-timber forest products in Bolivia and Mexico. CEPFOR report.

useful in covering some basic cash needs. NTFP activity can constitute an important part of the income and sometimes provides for the only cash income.

2. Changes in trade in NTFPs have a greater impact on women's livelihoods.

This is possible, particularly certain activities or stages. However, there are only few female only households in the database.

3. Increase in the volume of NTFP trade leads to forest overexploitation and/or domestication.

There was little evidence for this on the basis of the database.

4. Changes in the volume of NTFP trade lead to reduced rights/access to the resource for the poorest producers.

It was not possible to analyse this on the basis of the dataset.

5. The successful commercialisation of an NTFP depends critically on the existence of an accessible market, potential demand, and the access by producers, processors and traders to market information.

Yes, market information is important. However, an accessible marketplace is not necessary (selling to intermediaries is also OK). Some key entrepreneurs are able to find niche markets with sufficient demand to support the whole value chain. Successful commercialisation certainly depends on individual characteristics; however, key specific individual characteristics will vary by product and/or community.

6. The number of demanders and suppliers, the exertion of market power, barriers to entry, and the degree of vertical and horizontal integration determine how competitively poor producers, processors and traders can participate in NTFP commercialisation.

Lack of knowledge was found to be a major and significant barrier to further NTFP sales (all products) and hence to further entry. Other factors listed will be product specific. For instance, households have very different powers over setting prices depending on the product. While there may be a certain degree of integration in the chain, this does not make it necessary to (ab)use this.

## Appendix A Tables and Charts

Table A1	How has the contribution of NTFPs to your livelihood strategy changed? (numbers of households)
Table A2	How successful do you think you are compared to your peer? (numbers of households)
Table A3	How successful do you think you are (numbers of households)?
Table A4	Numbers of households with electrical lighting
Table A5	Roof of house (numbers of households)
Table A6	Floor in house (numbers of households)
Table A7	Percentages of households deriving selected percentages of their income from NTFP trade
Table A7	Percentages of households deriving selected percentages of their income from NTFP trade
Table A8	Education levels by stage for two products
Table A9	Mean income (US\$ per day, by stage of processing and product)
Table A10	Share of income from NTFP by product (Bolivia and Mexico)
Table A11	Share of income from NTFP and stage (Mexico and Bolivia)
Table A12	Mean livelihood contribution (by stage of processing and product)
Table A13	Success (by stage of processing and product)
Table A14	Average number of months active production/trading
Table A15	Means (all products by country)
Table A16	Means of male education for individual products
Table A17	Means of access to credit (1=yes, 0=no) for individual products
Table A18	Means of daily income (US\$ per household) for individual products
Table A19	Logit (1= control, 0=NTFP)
Table A20	What type of NTFP households want to continue or change NTFP activities.
Table A21	Percentage involvement by male and female heads of households in different stages of NTFP activities.
Table A22	Percentage involvement by male and female heads of households in processing and collection by product
Table A23	Time and changes in time required to collect NTFPs
Table A24	Correlation coefficients with time
Table A25	What determines change in time to collect?
Table A26	Future and past trade (1 in decline, 2 the same, 3 increase)
Table A27	What determines success?
Table A28	What determines increased importance in livelihood strategy (OLD)
Table A29	Including product effects
Table A30	Access to credit, means (% of households)
Table A31	Households with access to credit
Table A32	Barriers to entry to selling NTFPs (Bolivia and Mexico) as found by NTFP households

Chart A1	Mean household income by product (dollar per day)
Chart A2	Mean share of NTFP in total household income by product (by quartile: 4=100%)
Chart A3	Mean share of NTFP in total household income by product (Based on own calculations with fewer data)
Chart A4	Mean success and importance in livelihood strategy
Chart A5	Mean household income by community
Chart A6:	Average dollar income (per household)
Chart A7:	Mean education
Chart A8:	Education (number of household by level: 0,1,2,3)
Chart A9:	Access to credit (mean percentage)
Chart A10	Relationship between share and income
Chart A11	Bolivia NTFP Share versus total income
Chart A12	Mexico NTFP Share versus total income
Chart A13	Success, share and income levels for Brahea Dulcis
Chart A14	Comparing two Goma communities
Chart A15	Mean level of success for Palma Camedora (by access to credit)

**Table A1 How has the contribution of NTFPs to your livelihood strategy changed? (numbers of households) NTFP households**

Product (community)	Less than before	Same	More than before	Total
Copal (Pucasucho)	0	6	0	6
Incienso (Pucasucho)	0	16	0	16
Palma Camedora (Monte Tinta)	11	13	0	24
Brahea Dulcis (La Esperanza)	1	14	1	16
Brahea Dulcis (Topiltepec)	1	19	0	20
Cacao (Carmen del Emero)	0	4	18	22
Cacao (San Silvestre)	0	8	6	14
Goma (Santa Rosa de Challana)	5	0	0	5
Hongos (Cuajimoyolas)	0	1	4	5
Hongos (Latuvi)	0	3	9	12
Jipi Japa (Buenavista)	1	1	7	9
Jipi Japa (Candelaria)	0	2	12	14
Jipia Japa (El Carmen Surutu)	3	3	7	13
Jipi Japa (Potrero San Rafael)	0	5	1	6
Maguey (La Esperanza)	0	3	0	3
Maguey (Topiltepec)	0	9	0	9
Palma Tepejilote (Tiltepec)	2	8	5	15
Palma Tepejilote (Yagavila)	0	4	2	6
Pita (Agua Pescadito)	3	2	1	6
Pita (Arroyo Blanco)	1	3	18	22
Total	28	124	91	243

- Outliers include Cacao and Jipi Japa (doing well); Palma Camedora and Goma (doing less well)

**Table A2 How successful do you think you are compared to your peers (numbers of households)? NTFP households**

Product (community)	Less successful	Average	More successful	Total
Copal (Pucasucho)	0	5	1	6
Incienso (Pucasucho)	0	15	2	17
Palma Camedora (Monte Tinta)	11	9	4	24
Brahea Dulcis (La Esperanza)	5	8	1	14
Brahea Dulcis (Topiltepec)	13	7	0	20
Cacao (Carmen del Emero)	4	12	6	22
Cacao (San Silvestre)	3	9	2	14
Goma (Santa Rosa de Challana)	0	23	0	23
Goma (Tomachi)	2	13	0	15
Hongos (Cuajimoyolas)	7	5	1	13
Hongos (Latuvi)	6	5	2	13
Jipi Japa (Buenavista)	6	3	0	9
Jipi Japa (Candelaria)	8	3	2	13
Jipia Japa (El Carmen Surutu)	6	6	1	13
Jipi Japa (Potrero San Rafael)	4	0	2	6
Maguey (La Esperanza)	3	0	0	3
Maguey (Topiltepec)	9	0	0	9
Palma Tepejilote (Tiltepec)	5	9	1	15
Palma Tepejilote (Yagavila)	2	4	0	6
Pita (Agua Pescadito)	4	2	0	6
Pita (Arroyo Blanco)	10	12	0	22
Total	108	150	25	283

**Table A3 How successful do you think you are (numbers of households)? NTFP households**

Product (community)	Not very <sup>1</sup>	More or less	Very successful	Total
Copal (Pucasucho)	0	3	3	6
Incienso (Pucasucho)	0	11	6	17
Palma Camedora (Monte Tinta)	18	5	1	24
Brahea Dulcis (La Esperanza)	2	14	0	16
Brahea Dulcis (Topiltepec)	4	16	0	20
Cacao (Carmen del Emero)	3	19	0	22
Cacao (San Silvestre)	2	12	0	14
Goma (Santa Rosa de Challana)	0	23	0	23
Goma (Tomachi)	1	14	0	15
Hongos (Cuajimoyolas)	8	4	1	13
Hongos (Latuvi)	4	8	0	12
Jipi Japa (Buenavista)	5	3	1	9
Jipi Japa (Candelaria)	5	7	2	14
Jipia Japa (El Carmen Surutu)	4	9	0	13
Jipi Japa (Potrero San Rafael)	2	2	2	6
Maguey (La Esperanza)	1	2	0	3
Maguey (Topiltepec)	2	7	0	9
Palma Tepejilote (Tiltepec)	7	7	1	15
Palma Tepejilote (Yagavila)	4	2	0	6
Pita (Agua Pescadito)	6	0	0	6
Pita (Arroyo Blanco)	15	7	0	22
Total	93	175	17	285

<sup>1</sup> Cannot cover basic needs

<sup>2</sup> Can cover basic needs

<sup>3</sup> Can more than cover basic needs

- This is an absolute measure of “success”; household surveys indicate that households involved in Pita and Palma think they are not doing well.
- Involvement in incense is considered successful.

**Table A4 Numbers of NTFP households with electrical lighting**

	No	Yes	Total
Palma Camedora (Monte Tinta)	0	24	24
Brahea Dulcis (La Esperanza)	1	15	16
Brahea Dulcis (Topiltepec)	0	20	20
Cacao (Carmen del Emero)	5	20	25
Cacao (San Silvestre)	12	2	14
Goma (Santa Rosa de Challana)	14	0	14
Goma (Tomachi)	1	8	9
Maguey (La Esperanza)	0	3	3
Maguey (Topiltepec)	0	9	9
Palma Tepejilote (Tiltepec)	0	14	14
Palma Tepejilote (Yagavila)	0	6	6
Pita (Agua Pescadito)	0	6	6
Pita (Arroyo Blanco)	0	20	20
Total	33	147	180

- Most or all households in San Silvestre and Santa Rosa do not have electrical lighting, while households in the other communities for which there are data, do have electricity.

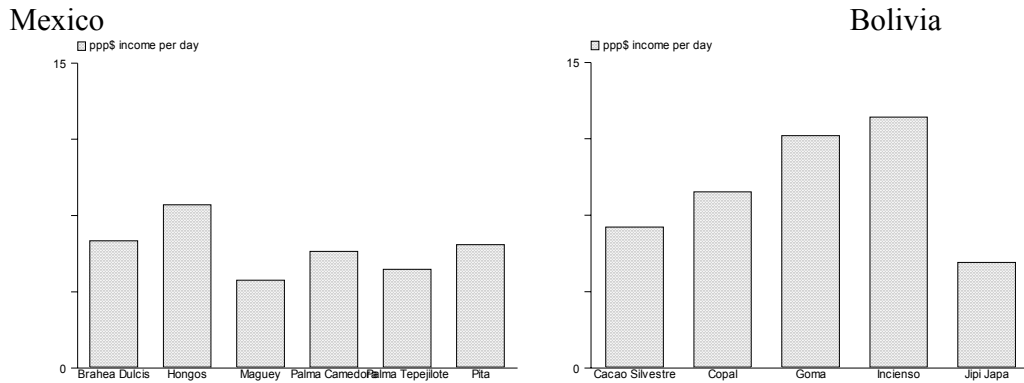
**Table A5 Roof of house (numbers of households) NTFP households**

	Tile	Tin	Wood	Thatched	Total
Copal (Pucasucho)	0	6	0	0	6
Incienso (Pucasucho)	0	14	0	2	16
Palma Camedora (Monte Tinta)	0	23	1	0	24
Brahea Dulcis (La Esperanza)	0	13	0	3	16
Brahea Dulcis (Topiltepec)	4	5	0	11	20
Cacao (Carmen del Emero)	0	0	0	23	23
Cacao (San Silvestre)	0	0	0	14	14
Goma (Santa Rosa de Challana)	0	10	0	11	21
Goma (Tomachi)	0	9	0	2	11
Maguey (La Esperanza)	0	2	0	1	3
Maguey (Topiltepec)	1	3	0	5	9
Palma Tepejilote (Tiltepec)	0	10	3	0	13
Palma Tepejilote (Yagavila)	1	4	0	0	5
Pita (Agua Pescadito)	3	3	0	0	6
Pita (Arroyo Blanco)	0	11	0	11	22
Total	9	113	4	83	209

**Table A6 Floor in house (numbers of NTFP households)**

	Cement	Laminated	Wood	Earth	Total
Copal (Pucasucho)	0	0	0	6	6
Incienso (Pucasucho)	0	0	0	16	16
Palma Camedora (Monte Tinta)	1	0	2	21	24
Brahea Dulcis (La Esperanza)	12	0	0	4	16
Brahea Dulcis (Topiltepec)	6	0	0	14	20
Cacao (Carmen del Emero)	0	0	0	23	23
Cacao (San Silvestre)	0	0	0	14	14
Goma (Santa Rosa de Challana)	11	0	0	10	21
Goma (Tomachi)	7	0	0	4	11
Maguey (La Esperanza)	2	0	0	1	3
Maguey (Topiltepec)	2	0	0	7	9
Palma Tepejilote (Tiltepec)	1	1	0	12	14
Palma Tepejilote (Yagavila)	1	0	0	5	6
Pita (Agua Pescadito)	5	0	0	1	6
Pita (Arroyo Blanco)	14	0	1	7	22
Total	62	1	3	145	211

**Chart A1 Mean NTFP household total income by product (dollar per day total income incl. subsistence)**

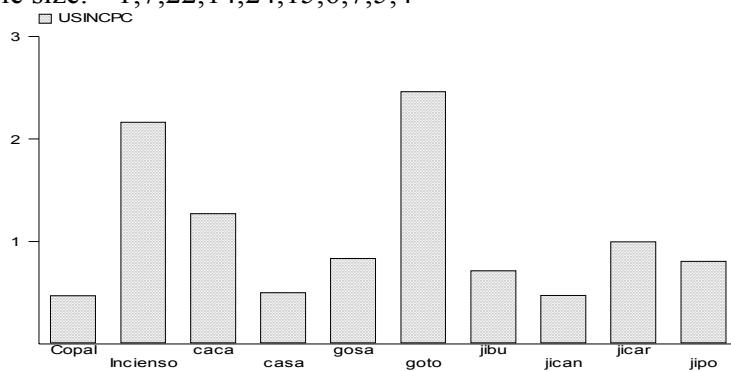


Sample size: 40;30;12;27;22;28

48;1;53;13;51

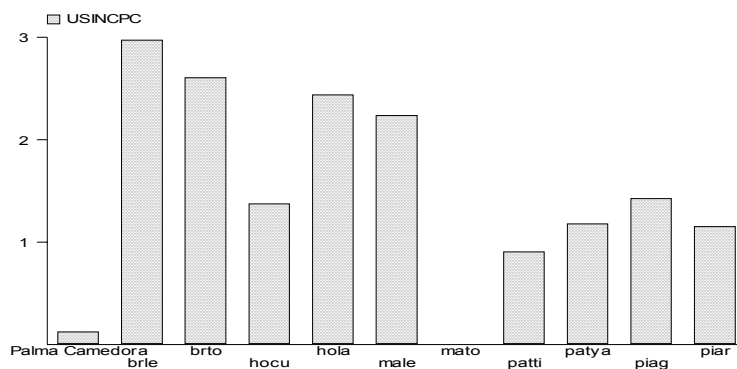
**Bolivia: dollar income per capita (by product and community)**

Sample size: 1;7;22;14;24;15;6;7;5;4



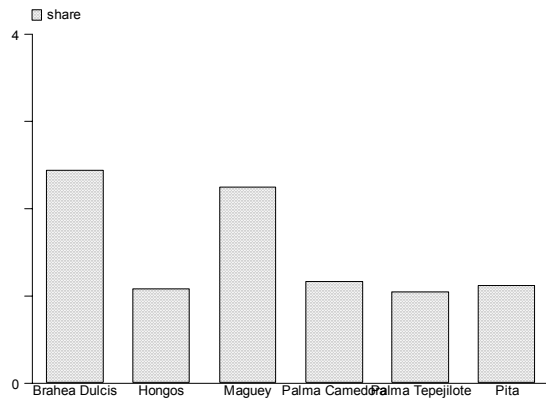
**Mexico: dollar income per capita (by product and community)**

Sample size: 24;16;20;12;12;1;15;5;1;8



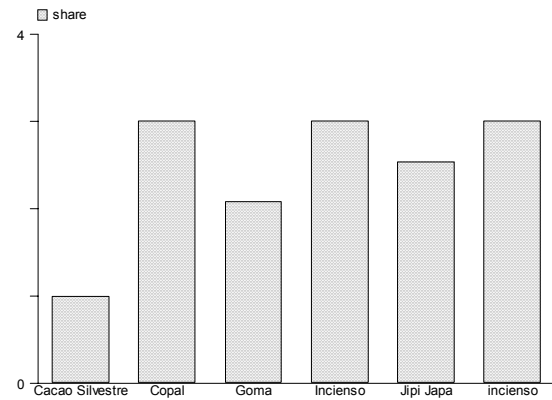
**Chart A2 Mean share of NTFP in total (cash + subsistence) income for NTFP households by product (share measured in quartiles: 1=0-25%, 2=25-50%, 3=50-75% and 4=75-100%)**

Mexico



Sample size 35;26;12;32;31;43

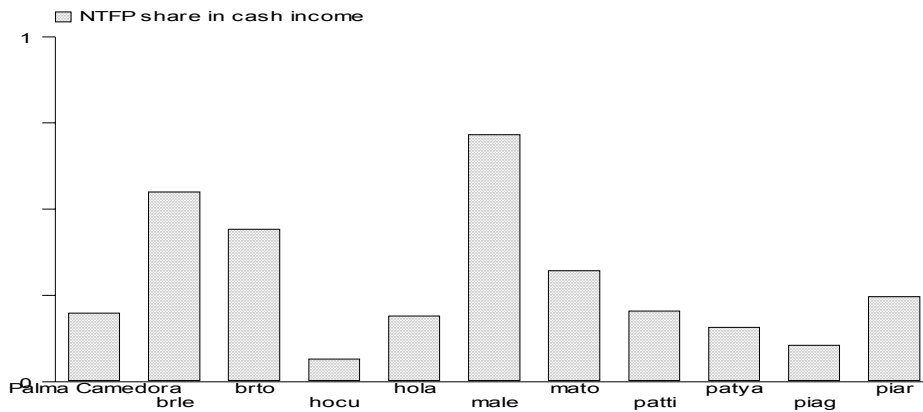
Bolivia



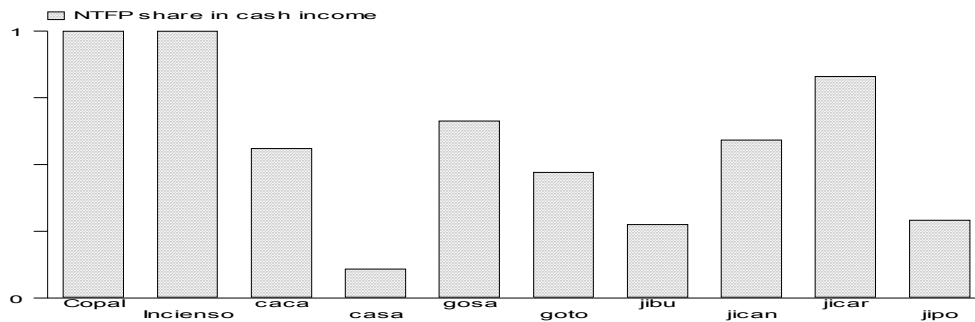
47;1;36;6;40;6

**Chart A3 Mean share of NTFP in total household cash income by product – community combinations (based on own calculations with fewer data)**

Mexico



Bolivia



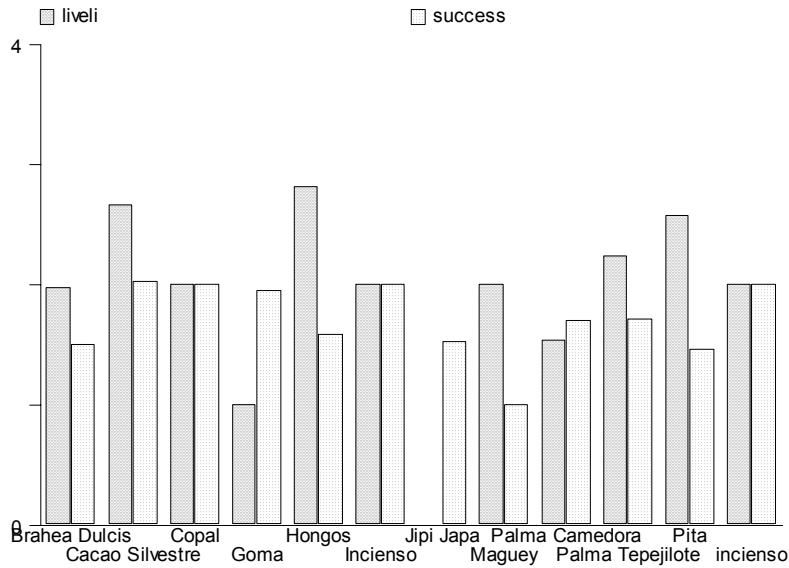
**TableA7 Percentages of households deriving selected percentages of their income from NTFP trade (based on household survey question 6.2)**

	<25%	<50%	<75%	>50% (i.e. more than half of total income)
Agua Pescadito	100	100	100	0
Arroyo Blanco	86	100	100	0
Buenavista	44	100	100	0
Carmen del Emero	100	100	100	0
Candelaria	0	50	71	50
Cuajimoyolas	100	100	100	0
El Carmen Surutu				83
La Esperanza	16	37	63	63
Latuvi	84	100	100	0
Monte Tinta	83	100	100	0
Potrero San Rafael	33	67	100	33
Pucasucho	0	35	100	65
San Silvestre	100	100	100	0
Santa Rosa de Challana	45	68	90	32
Tiltepec	100	100	100	0
Tomachi	20	53	100	47
Topiltepec	38	66	86	34
Yagavila	83	100	100	0
All communities (Bol)	43	66	90	34
All communities (Mex)	70	85	93	15

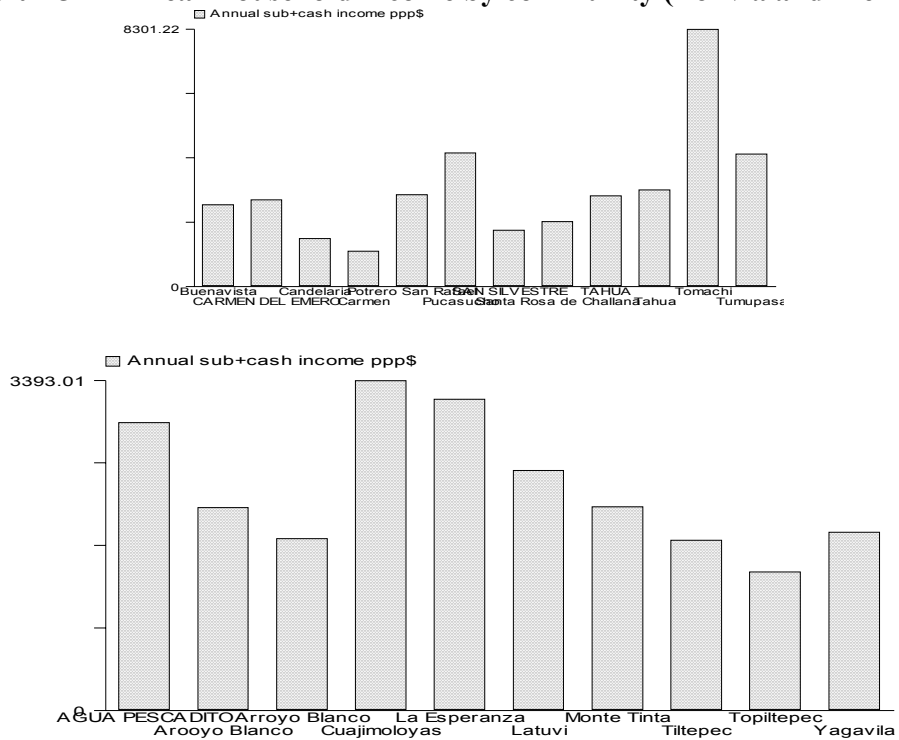
- A third of households in Bolivia depend on NTFP trade for more than half of their income.
- This is only a sixth in Mexico.

**Chart A4 Mean success and importance in livelihood strategy (averaged over NTFP households by product)**

liveli=how important have NTFPs been in the livelihood strategy (question 6.7; possible scores 1, 2, and 3); success=how successful do you consider yourself (question 6.6; possible scores 1, 2, and 3)

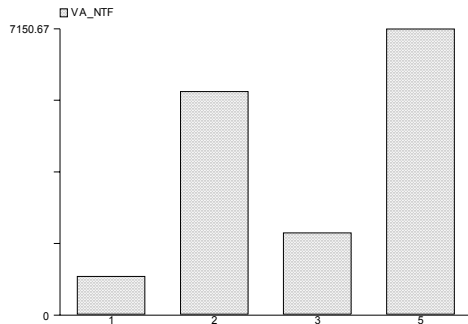


**Chart A5 Mean household income by community (Bolivia and Mexico)**

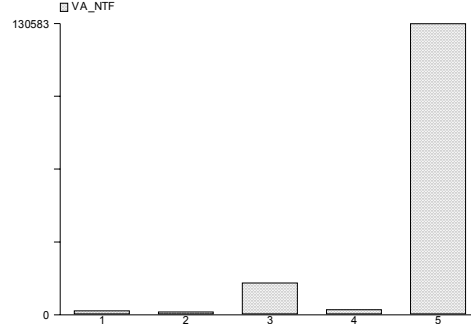


**Chart A6: Average annual value added (domestic currency)**

**Bolivia by stage of NTFP activity**



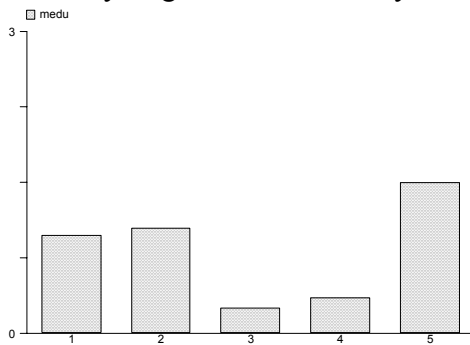
**Mexico by stage of NTFP activity**



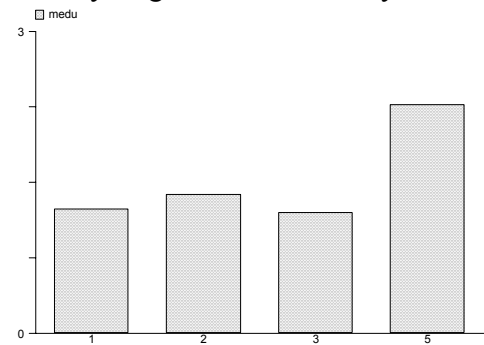
Stage 1 = production; Stage 2 = collection not production; Stage 3 = processing, not production and not collection; Stage 4 = other household; Stage 5 = traders

**Chart A7: Mean education of head of household (vertical scale from 0 (no education) to 1, 2, and 3 (third level education))**

**Mexico by stage of NTFP activity**



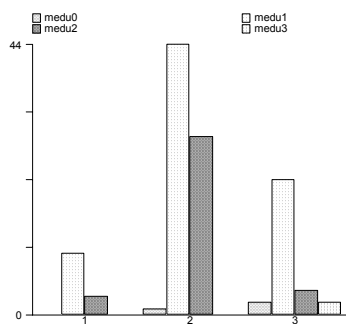
**Bolivia by stage of NTFP activity**



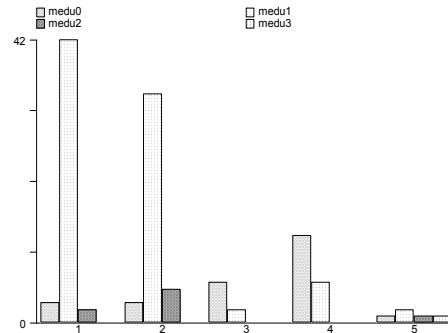
Stage 1 = production; Stage 2 = collection not production; Stage 3 = processing, not production and not collection; Stage 4 = other household; Stage 5 = traders

**Chart A8: Education, number of households by level of education completed: 0 -none, 1-first, 2-second, 3-third) and stage of NTFP activity**

**Bolivia**



**Mexico**



Stage 1 = production; Stage 2 = collection not production; Stage 3 = processing, not production and not collection; Stage 4 = other household; Stage 5 = traders

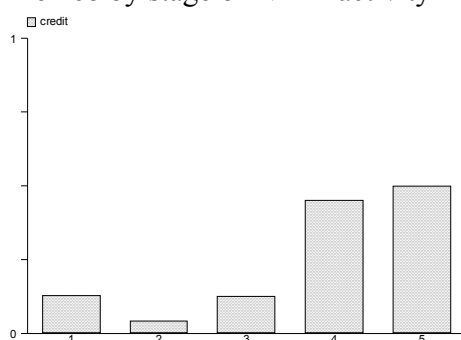
**Table A8 Education levels by stage for households involved in two NTFPs**

	Jipi Japa		Cacao Silvestre	
	Stage 2 Collection only	Stage 3 Processing only	Stage 1 Cultivation / production	Stage 2 Collection only
No education	0	2 (6%)	0	1 (4%)
Primary education	7 (100%)	25 (76%)	10 (77%)	23 (96%)
Secondary education	0	4 (12%)	3 (23%)	0
Tertiary education	0	2 (6%)	0	0

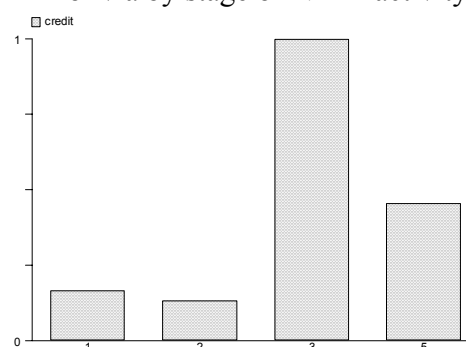
Stage 1 = production; Stage 2 = collection not production; Stage 3 = processing, not production and not collection; Stage 4 = other household; Stage 5 = traders

- More education is associated with more production or processing as opposed to collecting (for Jipi Japa and Cacao silvestre)

**Chart A9: Access to credit (share of NTFP households with access to credit) Mexico by stage of NTFP activity**



**Bolivia by stage of NTFP activity**



Notes:

Stage 1 = production; Stage 2 = collection not production; Stage 3 = processing, not production and not collection; Stage 4 = other household; Stage 5 = traders

Access to credit is either 1= yes or 0 = no; the mean of this variable over households thus represents the share of households with access to credit, with the share varying between 0 and 1

**Table A9 Mean total household income (PPP \$ per year, by stage of processing and product), for NTFP households**

	Stage 1 production	Stage 2 collection	Stage 3 processing	Stage 4 other
<b><i>Bolivia</i></b>				
Cacao Silvestre	2633 (13)	2135 (24)		
Goma		4167 (36)		
Inciensio		4501 (6)		
Jipi Japa		1804 (7)	1916 (33)	
Total (Bolivia)	2633 (13)	3298 (74)	1916 (33)	
<b><i>Mexico:</i></b>				
Brahea Dulcis	2180 (17)*=unknown	1908 (1)	3648 (6)	1763 (10)
Hongos		2931 (26)		
Maguey			2818 (2)	1226 (9)
Palma	867	1976	2307	
Camedora	(2)*=unknown	(21)	(1)	
Palma	1617	1757		
Tepejilote	(1)*=unknown	(20)		
Pita	2235 (27)			
Total (Mexico)	2122 (48)	2408 (48)	3440 (8)	1509 (19)

Note: Products with more than one observation are included

- Average income does not vary by stage in the chain for households (except when all observations are pooled together in Mexico). This can be proven on the basis of F-tests (oneway in STATA).
- Households involved in Palma camedora (Mexico) and Jipi Japa (Bolivia) are particularly poor, whatever the stage.

**Table A10 Share of income from NTFP, NTFP household count by product**

<i>Bolivia</i>		NTFP household count on share of income from NTFP				
		Share				
Product		0-25%	26-50%	51-75%	76-100%	Total
Cacao	Silvestre	36	0	0	0	36
	%	100	0	0	0	100
Copal		0	2	4	0	6
	%	0	33	67	0	100
Goma		13	10	12	2	37
	%	35	27	32	5	100
Incienso		0	6	11	0	17
	%	0	35	64	0	100
Jipi Japa		9	14	5	12	40
	%	22	35	13	30	100
Total		58	32	32	14	136
	%	43	24	24	10	100

<i>Mexico</i>		NTFP household count on share of income from NTFP				
		Share				
Product		0-25%	26-50%	51-75%	76-100%	Total
Brahea	Dulcis	10	8	10	8	36
	%	28	22	28	22	100
Hongos		24	2	0	0	26
	%	92	8	0	0	100
Maguey		4	4	1	3	12
	%	33	33	8	25	100
Palma	Camedora	20	4	0	0	24
	%	83	17	0	0	100
Palma	Tepejilote	20	1	0	0	21
	%	95	5	0	0	100
Pita		25	3	0	0	28
	%	89	11	0	0	100
Total		103	22	11	11	147
	%	70	15	8	8	100

**Table A11 Share of income from NTFP and stage (Mexico and Bolivia)**

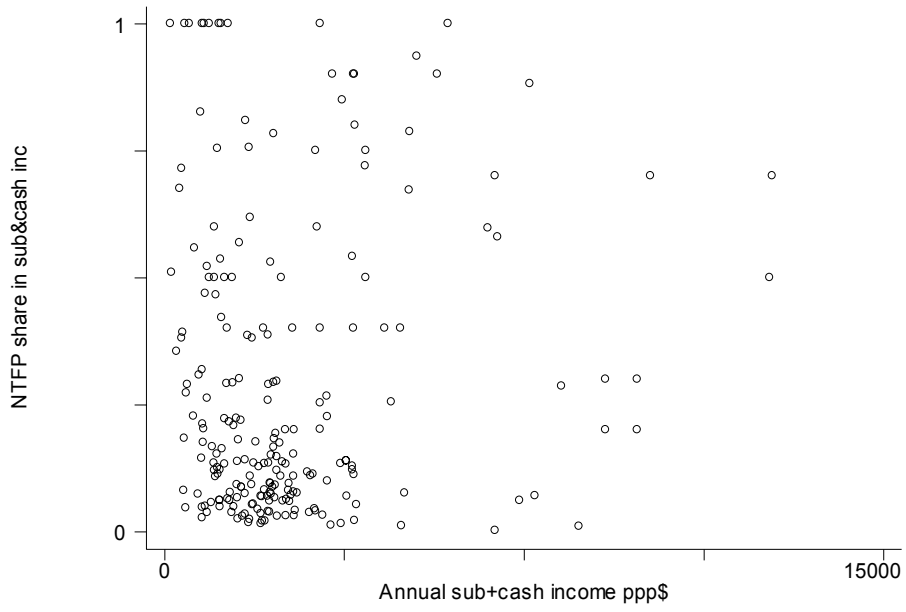
Mexico						
Share	NTFP activity stage					Total
	1	2	3	4	5	
0-25	43	45	2	7	8	105
in %	87.76	93.75	25.00	35.00	40.00	72.41
26-50	6	3	2	5	0	16
in %	12.24	6.25	25.00	25.00	0.00	11.03
51-75	0	0	0	4	6	10
in %	0.00	0.00	0.00	20.00	30.00	6.90
76-100	0	0	4	4	6	14
in %	0.00	0.00	50.00	20.00	30.00	9.66
Total	49	48	8	20	20	145
in %	100.00	100.00	100.00	100.00	100.00	100.00

Bolivia					
Share	Stage				Total
	1	2	3	5	
0-25	13	36	9	6	64
	100.00	40.45	27.27	26.09	40.51
26-50	0	21	10	15	46
	0.00	23.60	30.30	65.22	29.11
51-75	0	29	3	0	32
	0.00	32.58	9.09	0.00	20.25
76-100	0	3	11	2	16
	0.00	3.37	33.33	8.70	10.13
Total	13	89	33	23	158
	100.00	100.00	100.00	100.00	100.00

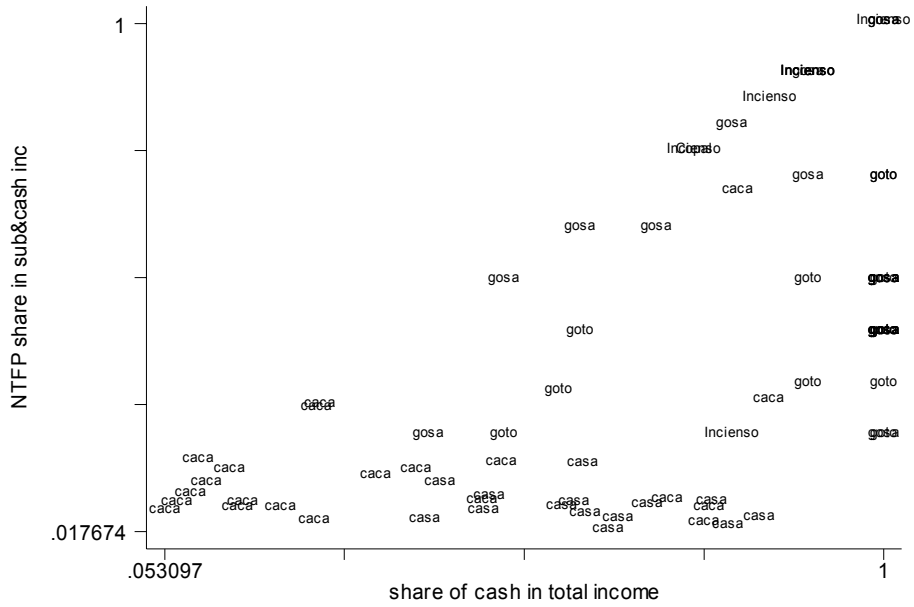
- In Mexico, almost all households involved in stage 1 and 2 also derive a smaller share of income from NTFPs, while around half of households involved in stages 4 and 5 derive a larger share (product specific: Maguey and Brahea dulcis).
- In Bolivia, all households involved in stage 1 derive a small share (but this is product specific: Cacao silvestre.). Stage 2 and 3 households are spread over categories (but stage 3 Jipi Japa mostly in third share category), while stage 5 traders are concentrated in lower share categories.
- The share of income derived from NTFP activity varies by product but not really by stage in the chain for households (except when observations are pooled over products in a country)
- Households involved in Palma (Mexico), Pita (Mexico), Cacao (Bolivia) and Hongos (Mexico) derive a modest share from NTFP trade, while Copal, Incense and Jipi Japa (Bolivia) and Brahea (Mexico) are amongst the top contributors.

**Chart A10**

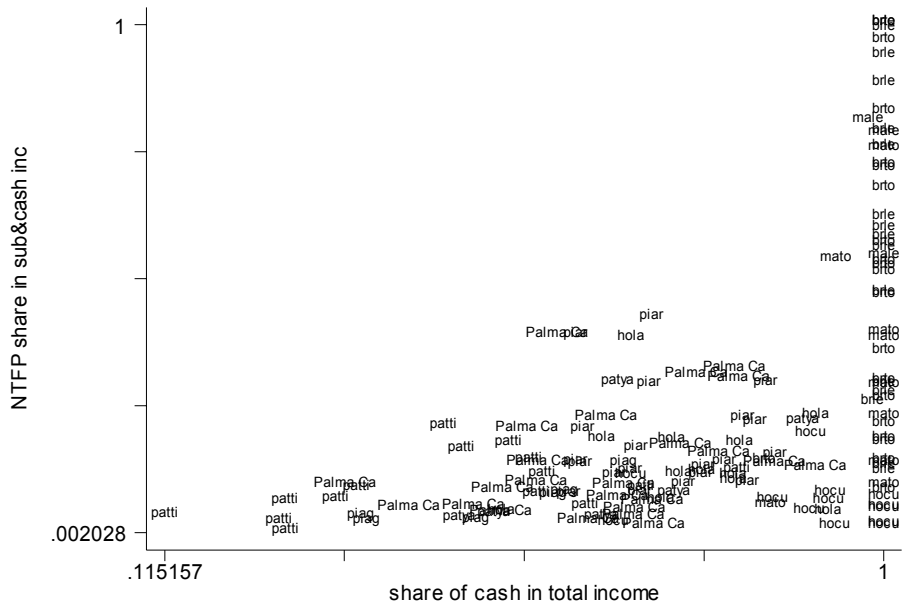
**Relationship between share and income**



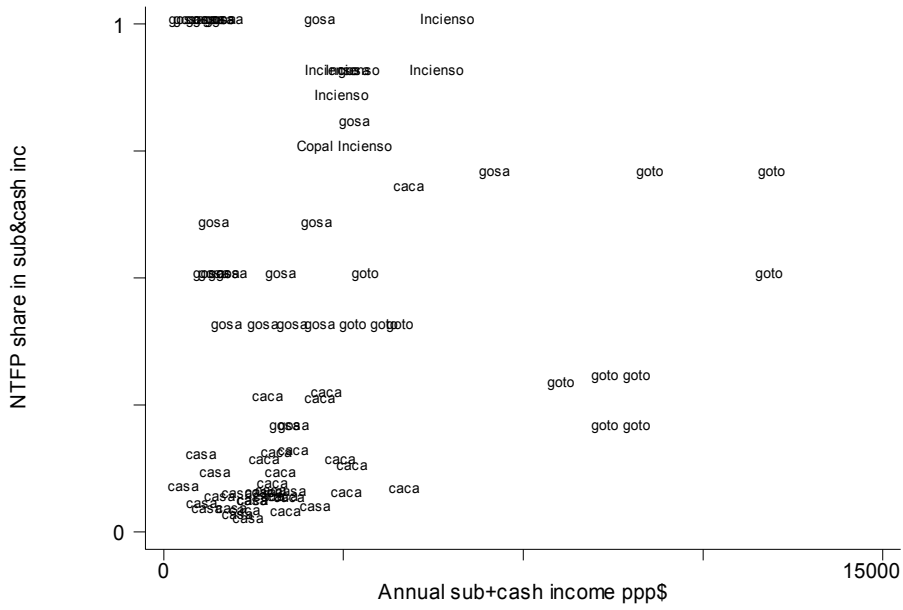
Bolivia: relationship NTFP share in subsistence income and share of cash income in total income



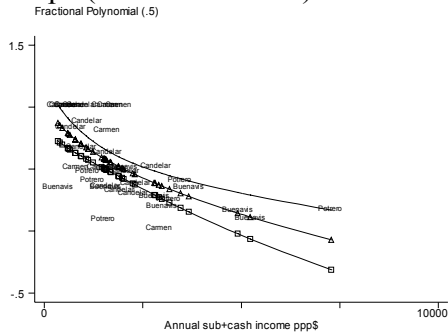
Mexico: relationship NTFP share in subsistence income and share of cash income in total income



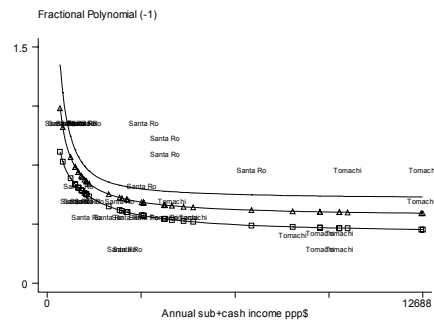
**Chart A11 Bolivia NTFP Share versus total income**



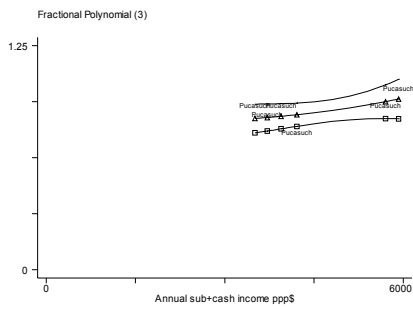
**Jipi Japa (share in cash inc)**



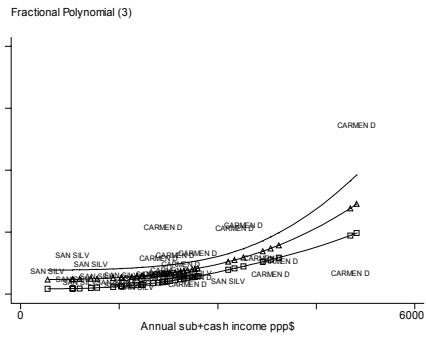
**Goma**



**Incense**



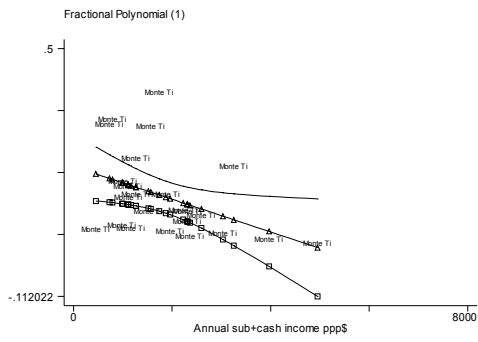
**Cacao Silvestre**



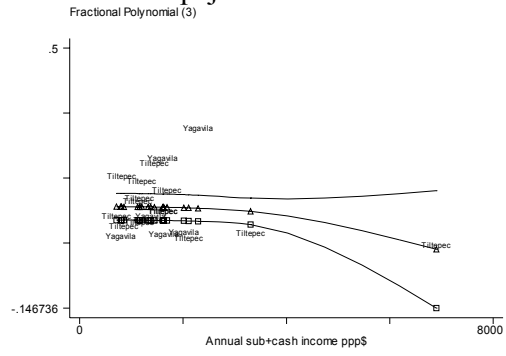
Note: A fitted fractional polynomial reflects the shape of a relationship between two variables, here share vs total income



## Palma camedora



## Palma tepejilote



Note: A fitted fractional polynomial reflects the shape of a relationship between two variables, here share vs total income

**Table A12 Mean livelihood contribution (by stage of processing and product)  
Scores on question 6.7 include 1, 2 or 3. Average over NTFP households.**

	Stage 1 Production/culti vation	Stage 2 Collection	Stage 3 Processing	Stage 4 Other
<b><i>Bolivia</i></b>				
Cacao Silvestre	2.7 (13)	2.7 (23)		
Goma		1 (5)		
Inciensio		2 (7)		
Jipi Japa				
Total (Bolivia)	2.7 (13)	2.3 (36)		
<b><i>Mexico</i></b>				
Brahea Dulcis		2 (1)	1.8 (6)	1.9 (10)
Hongos		2.8 (16)		
Maguey			2 (2)	2 (9)
Palma Camedora		1.6 (21)	1 (1)	
Palma Tepejilote		2.3 (20)		
Pita	2.6 (26)			
Total (Mexico)	2.1 (47)	2.4 (38)	1.9 (8)	1.9 (19)

Note: Products with more than one observation are included

- Mean contribution to livelihood does not vary by stage in the chain for households for individual products
- Households involved in Palma camedora (Mexico) do not regard the NTFP as a major contributor to their livelihoods.
- It appears to be better to be involved in stage 1 or 2 than 3 or 4.

**Table A13 Success (by stage of processing and product), average over NTFP households by product**

	Stage 1 Production/culti vation	Stage 2 Collection	Stage 3 Processing	Stage 4 Other
<b><i>Bolivia</i></b>				
Cacao Silvestre	2.1 (13)	2 (23)		
Goma		1.9 (38)		
Inciensio		2 (7)		
Jipi Japa	1.6 (7)		1.5 (31)	
Total (Bolivia)	2.1 (13)	1.9 (76)	1.5 (31)	
<b><i>Mexico</i></b>				
Brahea Dulcis		2 (1)	1.5 (6)	1.3 (10)
Hongos		1.6 (24)		
Maguey			1 (2)	1 (9)
Palma Camedora		1.7 (21)	2 (1)	
Palma Tepejilote		1.7 (20)		
Pita	1.5 (26)			
Total (Mexico)	1.6 (47)	1.7 (46)	1.4 (8)	1.2 (19)

Note: Products with more than one observation in more than one stage are included.

- Perceived level of success does not vary by stage in the chain for households for individual products (but it does vary for all observations grouped together, using F-tests).
- However, it should be noted that this analysis is based on a subjective variable comparing perceived success whose mean should converge to 2 at each stage if the right comparator had been taken. Nevertheless it appears to be better to be involved in stage 1 or 2 than 3 or 4.

**Table A14 Average number of months active production/trading as mentioned by NTFP households**

<i>Bolivia</i>	
Cacao Silvestre	4.4 (Carmen del Emero) 5.8 (San Silvestre)
Copal	12 (Pucasucho)
Goma	11.3 (Santa Rosa de Challana) 10.6 (Tomachi)
Inciensio	12 (Pucasucho)
Jipi Japa	11.3 (Buenavista) 10.9 (El Carmen surutu) 12 (Potrero San Rafael) 11.3 (Candeleria)
<i>Mexico</i>	
Brahea Dulcis	12 (La Esperanza) 12 (Topiltepec)
Hongos	2 (Cuajimoyolas) 2 (Latuvi)
Maguey	6.7 (La Esperanza) 7.3 (Topiltepec)
Palma Camedora	5.8 (Monte Tinta)
Palma Tepejilote	3.7 (Tiltepec) 3.7 (Yagavila)
Pita	2.7 (Agua Pescadito) 3.5 (Arroyo Blanco)

- Households involved in Palma tepejilote (Mexico), Pita (Mexico), Cacao (Bolivia) and Hongos (Mexico) derive a modest share from NTFP trade (see chart A2), and these are also products that are traded for only a limited number of months in a year.

**Table A15 Means (all products by country)**

	Bolivia			Mexico		
	Education (male)	Access to credit	Cash income (annual, Boliviano)	Education (male)	Access to credit	Cash&Sub Income (PPP\$)
NTFP households and traders	1.5 (161)	0.3 (155)	8135 (133)	0.9 (161)	0.2 (168)	2196 (144)
Controls	1.5 (67)	0.4 (31)	21036 (23)	0.9 (46)	0.05 (44)	2180 (35)
Prob of F- test (whether means differ by group)	0.71	0.40	0.00	0.81	0.03	0.95

Note: Data relate to household and trader surveys (3 outliers excluded)

**Table A16 Means of education of male head of households for individual products**

	Cacao Silvestre	Incienso	Jipi Japa	Goma	Hongos	Palma Camedora	Palma Tepejilote	Pita
NTFP households and traders	1.2 (43)	1.8 (21)	1.3 (44)	1.7 (43)	1.3 (27)	1.0 (27)	1.1 (23)	1.0 (29)
Controls	1.6 (20)	1.4 (16)	1.5 (25)	1.3 (6)	1.2 (10)	0.8 (8)	0.9 (11)	0.7 (16)
Prob of F- test (whether means differ by group)	0.00	0.04	0.34	0.11	0.77	0.35	0.30	0.01

Note: Data relate to household and trader surveys

Education is scored as 0 (no education), 1 (first level completed), 2 (second level completed) and 3 (third level completed).

**Table A17 Means of access to credit (1=yes, 0=no); averages for NTFP households/traders and controls, by products**

	Cacao Silvestre	Incienso	Jipi Japa	Goma	Hongos	Palma Camedora	Palma Tepejilote	Pita
NTFP households and traders	0.1 (42)	0.1 (21)	0.9 (44)	0.1 (45)	0.1 (29)	0.2 (27)	0.0 (25)	0.1 (29)
Controls	0.4 (10)	0.2 (6)	0.6 (25)	0.3 (9)	0.1 (10)	0.1 (8)	0.0 (10)	0.0 (15)
Prob of F-test (whether means differ by group)	0.07	0.64	0.03	0.05	0.98	0.55	0.53	0.21

**Table A18 Means of total annual income (PPP\$ per household unless otherwise stated) by product**

	Cacao Silvestre	Jipi Japa (cash, Bolivianos)	Palma Camedora	Palma Tepejilote	Pita
NTFP households and traders	2311 (37)	5066 (38)	1665 (22)	1750 (21)	1946 (25)
Controls	3028 (7)	4930 (3)	1400 (5)	1818 (10)	2071 (15)
Prob of F-test (whether means differ by group)	0.09	0.68	0.48	0.88	0.65

- NTFP traders/households tend to have the same level of education (Bolivia and Mexico) as their controls (who are not involved in NTFP trade); at product level, more education for controls of those involve in Cacao silvestre, less for controls for Incense and Pita; similarly, better access to credit for Jipi Japa traders than their controls, the reverse for Goma.
- With respect to income, NTFP households in Bolivia compare less favorably than their controls (no significant effect in Mexico) and with respect to access to credit, while NTFP households in Mexico compare more favorably. In particular, those involved in Cacao, and Palma tepejilote are worse off than their controls (although not significantly so).

**Table A19 Logit (1= control, 0=NTPF household or trader)**

	Bolivia	Mexico	Cacao silvestre
	Household	Household	Household
Education (male)	-0.4 (-0.5)	-0.1 (-0.34)	0.7 (0.5)**
Credit	-0.3 (-0.39)	-1.8 (-1.7)**	1.5 (1.2)
Ln ( income)	1.2 (2.1)*	-0.9 (-2.9)*	2.3 (2.5)*
Controls incl.	Yes	Yes	Yes
No obs	103	149	45

- Richer households (in Bolivia) are less likely to be involved in NTFP trade.
- In Mexico, this is different. The richer, or the more educated, the more likely you are to be involved in NTFP activities.

**Table A20 What type of NTFP households want to continue or change NTFP activities.**

	Bolivia			Mexico		
	Continue with same NTFP activities	Move to other stage	Move to other product	Continue	Move to other stage	Move to other product
Ln(Income) - annual household	0.03	0.28	-0.64*	1.04**	0.41	-0.18
Success (1,2 or 3)		0.77**			-0.58	
Share NTFP (1,2,3 or 4)	-0.21	0.24	0.43*	-0.38**	-0.33	-0.66**
Months (0-12)	0.28**	-0.04	-0.42*	-0.12*	0.06	0.01
Stage 2 (Collect not prod)		-0.93			0.15	
Stage 3 (Processing, not collect or prod)		-0.65			-1.5*	
Stage 4 Other (transport, etc.)					2.1*	
No (obs)	114	113	113	144	132	136

Note: Logit regression (dependent variable is 0/1 – no/yes); based on household data only

\* = 10% significant

\*\* = 5 % significant

- Households with higher annual incomes would like to continue with the same NTFP trade in Mexico; hence, poorer households want change
- In Bolivia, richer and more successful households do not want to change to selling different products, but want to move to a different stage in the production chain; this may indicate a learning effect.
- In Mexico, households that derive only a small share of their income from NTFP trade, are more likely to want to continue the present NTFP trade as well as moving into other products. This may be explained by the fact that a small share in income from NTFP is welcome but not sufficient.
- In Bolivia this is less clear; where there seems to be a product (i.e. month) effect. The more months a product can be traded the more likely a household wants to continue this activity, and the less likely the household wants to move into other products. Conversely, households involved in seasonal products may want to move into other products.
- In Mexico, households involved in processing are happier with their activity/stage than households that are not involved in collection, production or processing, such as transport.

**Table A21 Percentage involvement by male and female heads of households in different stages of NTFP activities.**

	Household	Activities by male head in household	Activities by female head in household
Production	23	27	14
<b>Collect</b>	65	<b>73</b>	<b>48</b>
<b>Process</b>	49	<b>29</b>	<b>57</b>
Transport	2	2	2

Note: percentages indicate the percentage of households (male head/female head defined as the oldest males and females in the household) working with an NTFP involved in a particular activity

**Table A22 Percentage involvement by male and female heads of households in processing and collection by product**

	Male (process)	Female (process)	Male (collect)	Female (collect)
<b>Bolivia</b>				
Cacao Silvestre	<b>35</b>	<b>89</b>	100	91
Goma	44	48	<b>100</b>	<b>57</b>
Inciensio			100	-
Jipi Japa	<b>63</b>	<b>100</b>	<b>44</b>	<b>0</b>
<b>Mexico:</b>				
Brahea Dulcis	<b>19</b>	<b>50</b>	6	0
Hongos			100	100
Maguey	33	10		
Palma			<b>90</b>	<b>76</b>
Camedora				
Palma			100	100
Tepejilote				
Pita	71	92		

Note: percentages indicate the percentage of households (male head/female head) working with a particular NTFP involved in a particular activity (e.g. 89% of female heads in households involved in Cacao silvestre are involved in processing).

- Gender differences in activity relate to collection (males more likely) and processing (females more likely). These differences are noticeable for Cacao, Goma, Jipi Japa, Brahea and Palma camedora

**Table A23 Time and changes in time required to collect NTFPs**

	Mean collection time (hrs)	What change in collection time	What change in collection time	What change in collection time	Mean response to change (1=less time, 2 stable, and 3=more time)
		Less time #	Stable #	More time #	Mean
<b>Bolivia</b>					
Cacao Silvestre	1.0 0.8 (Carmen del Emero) 1.3 (San Silvestre)	5	26	6	2.0
Copal	52	0	6	0	2.0
Goma	1.3 (Tomachi and Santa Rosa)	24	11	5	1.5
Incienso	87	0	16	0	2.0
Jipi Japa	2.4 2.1 (El Carmen Surutu) 3 (Potrero San Rafael) 2.4 (Candelaria)	17	5	0	1.2
<b>Mexico</b>					
Brahea Dulcis	1.8	0	12	18	2.6
Hongos	3.8 4.4 (Cuajimoyolas)	0	23	3	2.1
	3.1 (Latuvi)				
Maguey	1.3	0	11	1	2.1
Palma	2.1	1	4	13	2.7
Camedora					
Palma	1.4	2	12	0	1.9
Tepejilote					
<i>Difference</i>	0.00				0.00
<i>(oneway in STATA p value)</i>					

- Collection time varies by product, as do trends in collection time
- Copal and Incense take a long time to collect; cacao, goma and maguey a short time
- Brahea and Palma camedora take increasingly more time to collect.

**Table A24 Correlation coefficients with time**

	Average income	Success
<i><b>Bolivia</b></i>		
Cacao Silvestre	-0.28 (0.10)	-0.11 (0.53)
Copal Goma	0.07 (0.68)	0.32 (0.05)
Inciensio	0.27 (0.60)	
Jipi Japa	0.02 (0.93)	0.41 (0.07)
<i><b>Mexico</b></i>		
Brahea Dulcis	<b>0.58</b> <b>(0.00)</b>	0.28 (0.16)
Hongos	-0.11 (0.58)	0.26 (0.21)
Maguey	<b>0.60</b> <b>(0.04)</b>	
Palma Camedora	-0.43 (0.07)	0.34 (0.16)
Palma Tepejilote	0.07 (0.81)	-0.04 (0.89)

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t-values between parentheses

- Using simple correlation techniques, collection time is not correlated with income or success; positive and negative signs.
- The exceptions are Brahea and Maguey, where richer households also spend more time for collection.

**Table A25 Does past trade determine change in time to collect?**

	Time change
<b>Past trade</b>	-0.03 (-0.1)
<b><i>Bolivia</i></b>	
Cacao Silvestre	0.7 (1.0)
Copal	0.5 (0.2)
Goma	-1.5 (-2.10)*
Inciensio	0.5 (0.4)
Jipi Japa	-2.8 (-3.4)*
<b><i>Mexico</i></b>	
Brahea Dulcis	2.8 (3.8)*
Hongos	0.8 (1.0)
Maguey	0.9 (1.1)
Palma	3.0
Camedora	(3.5)*
Palma tepejilote	Control 183

Ordered logit estimate, dependent variable is 1 less time, 2 same time or 3 more time

Past trade = 1 less trade, 2 stable trade, or 3 more trade (changes in trade)

t-value between parentheses

\* significant at 5% level

A positive coefficient on past trade would indicate that more trade in the past would lead to an increase in collection time.

- Developments in past trade do not seem positively related to increases in the collection time. In fact, from this evidence, there are certain products that face longer collection time (e.g. Brahea, and Palma camedora) independent of development in past trade (i.e. increases in past trade do not necessarily lead to increased collection time).

**Table A26 Future and past trade (1 in decline, 2 the same, 3 increase), averages over NTFP households by product**

<i><b>Bolivia</b></i>	Future trade	Past trade
Cacao Silvestre	2.9	2.3
Copal	2.2	2
Goma	1.1	1.1
Inciensio	1.9	1.9
Jipi Japa	2.4	1.7
<i><b>Mexico</b></i>		
Brahea Dulcis	2	1.4
Hongos	2.7	2.1
Maguey	2.1	1.8
Palma	1.7	1.1
Camedora		
Palma	2.8	1.9
Tepijilote		
Pita	1.5	

Future trade = how do you expect NTFP trade to develop in future?

Past trade = how has NTFP trade developed in the past?

- All products are expected to fare better (or at least as well) in the future than they have perceived to have been in the past! This is likely to be optimistic.

**Table A27 What determines success? Seven different regressions for NTFP households**

	Dependent variable "Success" (1,2,3 ordered variable)						
Share	0.27 (2.32)*	0.62 (4.33)*	0.52 (3.57)*	0.56 (3.67)*			
Months					0.07 (1.91)**	0.06 (1.61)**	0.04 (1.05)
Stage 1		1.75 (3.77)*	1.61 (3.39)*	1.73 (3.58)*	1.41 (2.96)*	1.01 (1.98)*	1.05 (1.90)**
Stage 2		2.05 (5.14)*	1.85 (4.41)*	1.92 (4.46)*	1.70 (4.08)*	1.22 (2.54)*	1.24 (2.47)*
Stage 3		-0.03 (-0.05)	0.09 (0.19)	0.16 (0.30)	0.18 (0.34)	-0.27 (-0.46)	-0.16 (-0.27)
Ln(Income)			0.19 (1.26)	0.16 (1.02)	0.23 (1.45)	0.12 (0.61)	0.14 (0.68)
Credit				0.11 (0.31)	0.11 (0.31)	-0.08 (-0.20)	-0.04 (-0.10)
Male age						-0.01 (-0.79)	-0.01 (-0.68)
Female age						-0.01 (-0.48)	-0.01 (-0.35)
Male origin						0.29 (-0.55)	0.36 (0.91)
Female Origin						-0.90 (-2.33)*	-0.89 (-2.25)*
Slocation2							0.25 (0.73)
Slocation3							0.61 (1.51)
Price det							0.53 (1.40)
No (obs)	280	280	261	253	253	209	203

Notes: \* (\*\*) means significant at 5% (10%) level

Dependent variable: question 6.5. How successful do you regard yourself compared to your peer? (1 less successful, 2 same, 3 more successful)

Column 1 shows the regression of share of income and perception of success; column 2 shows the regression of share of income, stage of NTFP activity and success, etc.

**Table A28 What determines increased importance in livelihood strategy. Seven different regressions for NTFP households.**

	Dependent variable "Livelihood" (1,2,3 ordered variable)						
Share	-0.05 (-0.39)	-0.02 (-0.16)	0.12 (0.81)	0.01 (0.09)			
Months					-0.08 (-1.90)**	-0.06 (-1.45)	0.02 (0.48)
Stage 1		0.86 (2.08)*	1.13 (2.62)*	1.07 (2.44)*	0.59 (1.26)	0.79 (1.59)	1.75 (2.80)**
Stage 2		1.06 (2.99)*	1.52 (3.85)	1.58 (3.87)*	1.26 (2.93)	1.51 (3.12)*	2.39 (4.12)**
Stage 3		1.42 (3.32)*	1.49 (3.43)	1.04 (3.13)	1.03 (2.10)	1.36 (2.46)*	1.72 (2.67)
Ln(Income)			-0.11 (-0.64)	-0.08 (-0.45)	0.02 (0.13)	-0.02 (0.10)	-0.19 (-0.87)
Credit				0.65 (1.81)**	0.84 (2.23)*	0.73 (1.79)**	0.67 (1.55)
Male age						0.01 (0.82)	-0.00 (-0.25)
Female age						-0.01 (-0.57)	-0.01 (-0.67)
Male origin						0.64 (1.40)	0.50 (0.98)
Female Origin						-0.01 (-0.57)	-1.08 (-2.08)**
Slocation2							-2.12 (-5.10)*
Slocation3							-1.88 (-3.32)*
Price det							-0.25 (-0.61)
No (obs)	241	241	223	215	214	194	189

Notes: \* (\*\*) means significant at 5% (10%) level

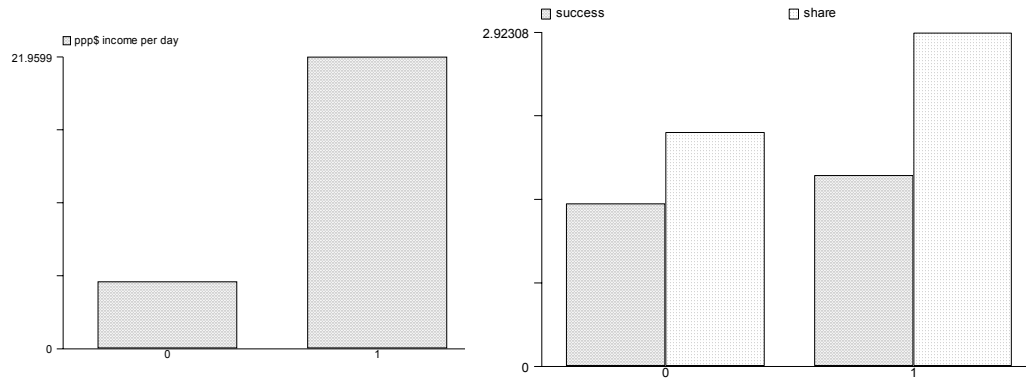
Dependent variable: question 6.7: How important have NTFPs been in your livelihood strategy? (1 less than before, 2 same, 3 more than before)

**Table A29 Including product effects. Regressions for NTFP households.**

	Dependent variable "Success", "Share" or "Livelihood" (ordered variable)					
	Share of income derived from NTFP trade	Success	Livelihood	Ln (Value added)	Share – Brahea Dulcis	Success – Palma Camedora
Share		0.79 (3.42)*	0.15 (0.44)			
Months	0.13 (1.73)**	-0.01 (-0.19)	0.05 (0.66)	0.17 (6.73)*		
Stage 1	-0.64 (-0.53)	0.21 (0.23)	0.93 (0.76)	0.37 (1.10)		
Stage 2	-1.19 (-1.21)	0.54 (0.63)	0.39 (0.32)	0.26 (0.87)		
Stage 3	-0.27 (-0.31)	0.12 (0.15)	-1.13 (-1.04)	-0.28 (-0.77)		
Ln(Income)	0.02 (1.18)	0.02 (1.88)**	-0.012 (-0.76)			
Credit	0.35 (0.68)	0.59 (1.17)	0.26 (0.61)	0.18 (0.74)		2.07 (1.82)**
Male age	-0.025 (-1.59)	-0.01 (-0.63)	-0.04 (-2.21)*	-0.03 (-3.79)		
Female age						
Male origin	0.51 (1.09)	-0.20 (0.56)	-0.29 (-0.56)	1.13 (0.28)		
Female Origin				-0.52 (-2.08)		
Selling outside community	1.18 (2.06)*	-0.21 (-0.50)	-2.37 (-3.66)*	-0.51 (-2.51)		
Selling to intermediary	0.49 (0.91)	0.23 (0.20)	-2.00 (-2.60)	0.13 (0.46)		
Price det	-0.08 (-0.14)	-0.35 (-0.73)	-0.41 (-0.61)	-0.13 (-0.58)		
Product dummies includes	YES	YES	YES	NO		
Medu1	0.99 (1.42)	-0.38 (-0.61)	-0.67 (-0.98)		1.39 (2.01)*	-0.22 (-0.21)
Medu2	0.40 (0.42)	0.23 (0.28)	-0.38 (-0.34)			
Medu3						
Fedu1						1.07 (0.88)
No (obs)	236	233	170	201	36	24

Notes: \* (\*\*) means significant at 5% (10%) level

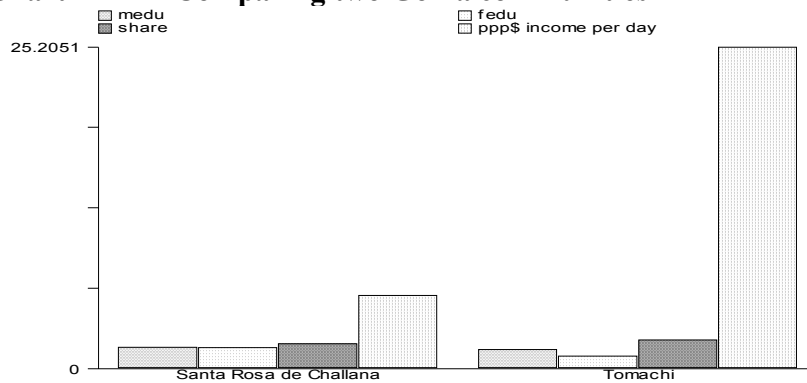
**Chart A13 Success (average of score for question 6.6), share (derived from NTFP trade, average of score from question 6.2) and income levels (PPP per household per day) for Brahea dulcis**



0= no education (men)  
1=primary education (men)

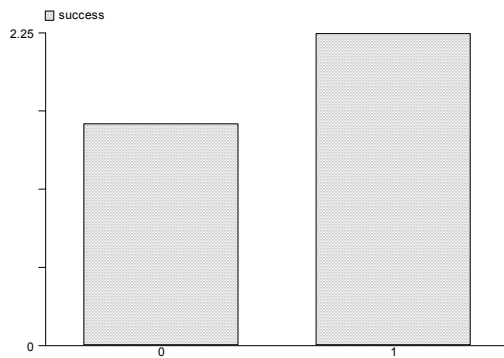
- There are clearer relationships at product level (Brahea Dulcis). More education is related to more success in NTFP commercialisation and a higher share of income from NTFP
- More generally, more education is correlated with income

**Chart A14 Comparing two Goma communities**



Big differences in incomes between two Goma communities.

**Chart A15 Mean level of success for Palma camedora (by access to credit)**



0 = no access to credit  
1 = access to credit

**Table A30 Access to credit, means (% of households)**

***Bolivia***

Cacao Silvestre	6
Copal	0
Goma	8
Inciensio	12
Jipi Japa	97

***Mexico:***

Brahea Dulcis	28
Hongos	4
Maguey	25
Palma	17
Camedora	
Palma	5
Tepijilote	
Pita	7

**Table A31 Households with access to credit**

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	<i>Percentage</i>
Agua Pescadito	0
Arroyo Blanco	9
Buenavista	100
Carmen del Emero	9
Candelaria	100
Cuajimoyolas	0
El Carmen Surutu	0
La Esperanza	0
Latuvi	8
Monte Tinta	17
Potrero San Rafael	100
Pucasucho	9
San Silvestre	0
Santa Rosa de Challana	9
Tiltepec	7
Tomachi	7
Topiltepec	44
Yagavila	0

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**Table A32 Barriers to entry to selling NTFPs (Bolivia and Mexico) as found by NTFP households, percentage of households answering yes:**

Variable	Mexico		Bolivia	
	Mean	Std. Error	Mean	Std. Error
Access to finance	.3082707	.0401927	.4344262	.0450619
Family situation?	.0526316	.0194355	.2704918	.0403831
Lack of appropriate infrastructure	.075188	.0229517	.3442623	.0431934
Taxes and regulations	.0075188	.0075188	0	0
Lack of information	.2330827	.0367995	.0901639	.0260379
Technical capacity	.0902256	.024937	.1803279	.0349509
Monopolisation	.0676692	.0218622	.0081967	.0081967
Contacts in market	.6842105	.0404582	.3770492	.0440589
Knowledge of market	.6992481	.0413171	.4180328	.0448396
Other	.0150376	.0105928	.0081967	.0081967

Mexico: observations on 133 households

Bolivia: observations on 122 households

- Main barriers to entry in Mexico include: Knowledge of and contacts in the market, access to finance and lack of information more generally.
- Similar barriers are faced by traders in Bolivia, but in addition, lack of appropriate infrastructure and the family situation impede access to selling NTFPs.
- Most barriers are present to a larger extent in Bolivia, though lack of knowledge of market is (relatively) more important in Mexico.
- Lack of knowledge of market and lack of contacts may suggest that there is not sufficient demand to sell products easily, although in principle this could also be because of a co-ordination failure between supply and demand. If the latter is the case, better co-ordination and supply of information is required, while better infrastructure and credit facilities may also be required in order to encourage NTFP activities.

**Table A33 NTFP Value added (ppp \$ average per household) and destination of sales**

	Destination of sales		
	Own community	Other community	To intermediaries
Copal		2367	
Incienso	5129	4142	
Palma Camedora		205	
brle	430		2903
brto	259	235	430
caca	325	96	
casa		84	
gosa	526	2183	1293
goto	6055	3655	2301
hocu	164		
hola	348		
Jibu	547		
jican		737	
jicar	459	893	371
Jipo		705	
Male	1792		
Mato	188		
Patti		287	116

**Table A34 Knowledge of the market and value added**

	Ln (value added) – Mexico	Ln (value added) – Bolivia
Market contacts	-0.25 (-1.05)	-0.30 (-1.35)
Market knowledge	-0.25 (-1.02)	-0.89 (-3.31)*
Specific product info	-0.29 (-1.09)	-0.39 (-1.10)
Product dummies	Yes	Yes
N obs	127	113
R-squared	0.15	0.58

The variables relate to answers on whether the variable was a barrier to sell further NTFPs. Value added = Total NTFP sales – NTFP purchases. Regression for NTFP households

## Appendix B Hypotheses and subquestions (as of July 2004).

<p><b>1. Changes in commercialisation in NTFPs have a greater impact on the poorest producers, processors and traders.</b></p>	<p><i>Data source</i> [MR= market report CR=Community reports Q= hhd questionnaire]</p>	<p><i>Form of analysis</i></p>	
		<p><i>General comments – household analysis</i> Key variables (source hhd ques) We aim to include significance levels and where possible disaggregate the analysis by stage/community/product</p>	
<p><b>1.1</b> What changes in commercialisation have occurred in the last 10 years?</p>	<p>MR2; CR9</p>	<p>Text analysis</p>	
<p><b>1.2</b> Are the same individuals involved in production (wild collection and cultivation), processing and trade?</p>	<p>Q 1.1; CR7.5, 7.6</p>	<p>Regression against success; Tabulation by products and communities</p>	
<p><b>1.3</b> What is the level of poverty of those involved in NTFP extraction – is it true that it is the poorest that are most involved, and what share of income do they derive from NTFP trade?</p>	<p>CR 2.4 Q1.3 and 6.1 on income Q6.2 on share of income from NTFP</p>	<p>Text analysis; Relating <b>income</b> (and wealth ranks) to <b>NTFP involvement</b> (using tabulations) including stage of involvement. May also be possible to do Chi-Square.</p>	
<p><b>1.4</b> Do people engage in NTFP extraction because they are poor or are they poor because they are dependent on extraction for their livelihoods?</p>	<p>Q6.9 - 6.11 on exit from NTFP trade</p>	<p>Extremely difficult: leave for ultimate consideration – ref to MA &amp; discuss chicken &amp; egg scenario)</p> <ul style="list-style-type: none"> <li>• Model decision to be involved in NTFP (<b>logit regression</b>); need to include control group (non-NTFP trades may have different characteristics from NTFP traders) and determine explanatory variables – <b>this needs to be explained</b></li> <li>• Determine what type of households want to move out of NTFP trade</li> </ul>	
<p><b>1.5</b> Do NTFP extraction activities primarily make up shortfalls in income or do they provide a path to socio-economic advancement? In other words, are they alleviating poverty or just providing a means of survival?</p>	<p>CR7.2; 5.1 Exit questions in Q6</p>	<p>Text analysis Identify products with a Shortfall scenario (i.e. only engage when situation economically bad) and those that are Alleviating poverty (look at whether NTFPs help people to move onto better things)</p>	
<p><b>1.6</b> Does reliance on NTFPs perpetuate poverty, e.g. by increasing debt?</p>	<p>MR3 &amp; 4 Q3.1, 5.1</p>	<p>Text analysis, Also tabulation of forms of payment: proportion of credit vs cash</p>	
<p><b>1.7</b> Is the distribution of profits equitable along the market chain?</p>	<p>All transaction cost questions, eg Q2.?, 3.3, 4.2, 5.3,</p>	<p>Transaction cost analysis (TCA), profit flows, CBA, barriers to entry and hhd income analysis: Compare <b>average profit margins</b> at different stages</p>	
<p><b>2. Changes in commercialisation of NTFPs have a greater impact on women's livelihoods.</b></p>	<p><i>Data source</i> [MR= market report CR=Community reports Q= hhd questionnaire]</p>	<p><i>Form of analysis</i></p>	
		<p>General comments: Key variables (source hhd ques) We aim to include significance levels and where possible disaggregate the analysis by stage/community/product</p>	
<p><b>2.1</b> To what extent are women involved in harvesting, processing, transport and marketing of the NTFP?</p>	<p>CR3.4 and 7.3-7.7 Q1.1 (by gender)</p>	<p>Text analysis Relate <b>income</b> (and wealth ranks) to <b>NTFP involvement by men and women separately</b> (using tabulations). We can distinguish</p>	

		between female only, male only and joint households, and we could examine joint households more closely to see whether females dominate certain stages. Tabulate percentage ( <b>type of activity and gender</b> )	
2.2 To what extent do women have control of the income derived from NTFPs, and therefore, to what extent do they benefit from their sale?	CR7.7	Text analysis	
2.3 Are women displaced by men when new technologies for NTFP processing are introduced?	CR7.5 and CR 9.4	Text analysis	
2.4 Is women's social, political and economic status being helped or harmed by NTFP commercialisation?	CR 9.4 Q6.2, 6.3, 6.4 and 6.7 and link to Q1.1	Text analysis. Economic status: Tabulate the percentage of women for whom NTFPs make a contribution to their livelihoods – see also Ho 2.1	

<b>3. Increase in the volume of NTFP commercialisation leads to forest overexploitation and/or domestication.</b>	<i>Data source</i> [MR= market report CR=Community reports Q= hhd questionnaire]	<i>Form of analysis</i> (Note: Undertake an analysis for each product separately)	
3.1 Is there any evidence of an increase in the volume of NTFP trade in the last 10 years: overall & for the community? And if so why?	MR4; CR9.1	Text analysis	
3.2 Is there evidence of resource depletion? What are social, economic or biological causes of any depletion observed?	CR9.5 Q1.3, 2.3 and 2.4	Text analysis Tabulation of transport times	
3.3 Is there evidence of harvesting moving to different areas in response to depletion?	CR 7.3	Text analysis Tabulation of transport times	
3.4 Is there any relationship between property regimes / institutional conditions and forest overexploitation, domestication or development of management strategies for the wild resource?	CR7.3; (3.3 & 3.4); 4.1	Text analysis	
3.5 Is there a relationship between biological characteristics of the NTFP and whether increased NTFP trade leads to domestication?	CR7.4, 9.5	Text analysis Use product variable as explanatory variable in regression analysis for success: note that little can be said as there is little product variation (few products). Need to score domesticability at community level (eg 0-4); Table (perish, repro (mat), yield, regen, impact on ind (kills, damage, neutral) & pop (Reg, Correl) [investigate use of CIFOR-type indicators]	
3.6 Are there biological / ecological constraints to successful commercialisation? eg low or variable productivity? etc.	CR 7.3 Q3.4	Text analysis	
3.7 Is there a relationship between poverty indices and domestication versus distance to resource?	Q2.4, 2.5 and 2.9	Tabulation Link individual variable on distance to individual variable of success in regression analysis. Individual variable of success VS proportion of product obtained from wild / cultivated source	

<b>4. Changes in the volume of NTFP commercialisation lead to reduced rights/access to the resource for the poorest producers.</b>	<i>Data source</i> [MR= market report CR=Community reports Q= hhd questionnaire]	<i>Form of analysis</i>	
<b>Note: refer to Ho 3.1</b> for any evidence of an increase in the volume of NTFP trade in the last 10 years: overall & for the community			
<b>4.1</b> Has the change in commercialisation had an impact on rights/access to the resource?	CR 3.1 & 3.3; 9.5; 7.3 (& 3.3, 3.4)	Text analysis	
<b>4.2</b> Does the type of access to, or ownership regime of resource constrain successful commercialisation?	CR 7.3 Q2.3, 2.7	Text analysis	

<b>5. The successful commercialisation of an NTFP depends critically on: the existence of an accessible market; potential demand; the absence of substitutes; access by producers, processors and traders to market information; technical management capacity; organisation; high value / unit wt; trader characteristics (age, experience, education, etc.)</b>	<i>Data source</i> [MR= market report CR=Community reports Q= hhd questionnaire]	<i>Form of analysis</i>	
<b>5.1</b> Does the successful commercialisation of an NTFP depend critically on the existence of an accessible market?	<b>CR 2.3, MR2</b> Q5.5, Q5.6	<b>Text.</b> <b>Regression. Accessible markets: individual variable based on categorisation of answers to Q5.5 and 5.6 on distance to markets.</b>	
<b>5.2</b> Does the successful commercialisation of an NTFP depend critically on potential demand?	Q6.8, MR4	Regression and Text	
<b>5.3</b> Does the successful commercialisation of an NTFP depend critically on the absence of substitutes?	MR 4	Text	
<b>5.4</b> Does successful commercialization depend on the capacity to innovate/			
<b>5.5</b> Does the successful commercialisation of an NTFP depend critically on access by producers, processors and traders to market information?	CR 7.8, 8.2, MR 9 Q5.6 and Q3.4	Text. Regression on access to information: individual variables based on classification of Q5.6; or member of association, Q3.4	
<b>5.6</b> Does the successful commercialisation of an NTFP depend critically on technical management capacity?	CR 3.4, 7.8	Text	

5.7 Does the successful commercialisation of an NTFP depend critically on organisation?	CR 8.2, 9.3, 4.1, 4.2	Text	
5.8 Does the successful commercialisation of an NTFP depend critically on high value / unit wt?	MR 1	Text	
5.9 Does the successful commercialisation of an NTFP depend critically on trader characteristics (age, experience, education, etc)?	CR8.3, 9.3 Q1.1	Text Regression of Trader characteristics: individual variables from Q1.1	

<b>6. The success of poor producers, collectors, processors and traders in NTFP commercialisation depends critically on: the number of suppliers and demanders (mkt structure); capacity to exert market power; barriers to entry; degree of vertical and horizontal integration.</b>	<i>Data source</i> [MR= market report CR=Community reports Q= hhd questionnaire]	<i>Form of analysis</i>	
6.1 What is the equitability of profit distribution along the market chain?	MR 7, & 8 Q3, Q4, Q5	Text. Determine profit based on Q3, 4 and 5 and examine average across different stages: output in table. TCA, profit flows, CBA, barriers and hhd income analysis	
6.2 Who controls the profits along the value chains?	CR 7.7 Q3, Q4, Q5	Text. See 6.1 above: TCA, profit flows, CBA, barriers and hhd income analysis	
6.3 Are markets for NTFPs perfect (e.g. are prices closely linked to the cost of production) and do markets reflect supply and demand?	MR 5, CR 8.3	Text.	
6.4 What is the demand, and are the demand curves inelastic? What is the likely trend in future demand? Is there a link between price and resource depletion as Homma suggests?	MR	Need to know about overall trends in consumption /production, but may only be possible for a few products with good secondary data. (also in relation to increases in income) Link to Q6.8 (expectation of demand) and to demand variables in MR.	
6.5 How does the marketing network (more precisely: a trading network) function? Do they result in the exploitation of extractors? Does the network change over time?	MR 2	Text.	
6.6 Are there actually a variety of trading networks for different NTFPs?	MR 2, CR 8.1	Text.	
6.7 Is there monopolization (eg of transport, information) at various NTFP stages and how does this affect success at previous stages?	MR 9	Text. Regression analysis: determine the marginal effect of <i>The number of traders in successive stages</i> on success.	
6.8 Is there a lack of access to credit, transportation, information on price fluctuations, storage facilities?	CR 8.2 Q1.4, 5.5, 5.6	Text. This will be picked up as explanatory variables in regression analyses determining success, e.g. Q1.4 (access to credit, and what type) and 5.5 and 5.6 (information from where), see also hypothesis 5 above	
6.9 To what extent do prices fluctuate at local and international level over the last 5 years and to what extent does this represent a risk to producers and traders?	MR 5, CR 8.3	Text.	
6.10 Do state (or non-state) institutions play a role in marketing?	MR 10, CR 4, 8.2, 8.4 Q4.3, 5.4	Text. This will be picked up as explanatory variables in regression analyses determining success, Q4.3 and 5.4 (membership of association)	

## **Appendix C Income, sales, and value added for households involved in NTFP** *A closer look at the data in the database shell.*

It is crucial to obtain data on household income level, NTFP sales and productivity to get a broader picture of NTFP activities and their success in generating income. The household level questionnaire can provide such data. The database based on the questionnaire contains three different sections on incomes:

- Question 1.3: What are the sources of income?
- Question 6.1: What was your gross income in the past year?
- Question 3.2 and 5.2: What was the value of total NTFP inputs and sales?

Aggregating data at household level could in principle provide data relatively easily. There are however several issues that we need to address:

- For most Mexican products the sources of income in question 1.3 are based on total income including the value of agricultural production converted into cash, while for many Bolivian products sources of income refer to cash income only.
- In some cases question 1.3 provides data on shares as opposed to absolute incomes.
- In some instances, the database provides NTFP sales data for 6.1 and these should have been inserted in 5.2 (Goma, Palma camedora, Copal and Incense)
- Cash income and NTFP sales refer to income in the form of money revenues. If costs are involved, money revenue is not the income (labour return) that a household earns. This becomes particularly important for households that buy and sell NTFPs (i.e. traders or processors). In this case we need to subtract the level of “raw materials inputs”.
- There are some irregularities in the database that need cleaning (apart from the obvious problems of translating database values into sensible numerical data.

We have attempted to solve these issues by

- Making a differences between
  - **Total income** = Cash income and hunting, fishing and agriculture production converted into cash income. Most products provide data for this in 1.3. For Incense, Copal and Goma (also controls), it required a calculation using NTFP income in 5.2 (which was sometimes given in 6.1) and shares given in 1.3.
  - **Cash income** = Total income minus subsistence income from hunting, fishing and agriculture. The data used are in section 1.3 (and 5.2 in the case of Incense, Copal and Goma)
  - **NTFP income** = Sales of NTFPs
  - **NTFP value added** = Sales of NTFPs minus costs of NTFP inputs.
- Assuming that 6.1 is equal to total cash income for traders in Cacao silvestre, Incense, Jipi Japa and Goma, and for Jipi Japa (households and their controls), because there are no data given in 1.3 and income seems to refer to cash income only.
- Using and constructing total costs of NTFP purchases (sometimes data in 3.1 given in volumes, which should be combined with prices data on 3.1, see Brahea dulcis)
  - Some households face problems and should not or only partly be used

- Sometimes NTFP sales data are not given in 5.2, but in 1.3.
- There are some errors in original income data in 6.1 or annual rather than monthly,
- General issues related to input in database: remove dots, \$ signs etc.

Despite substantial data cleaning, uncertainties surrounding the data will remain. The following observations can be made after the analysis:

- Income has different meanings in different settings. However, the main difference appears to be between Mexican and Bolivian settings. The database can be used to reconcile both approaches, but care should be taken when interpreting the “made-up” data. For instance, for Goma we used the total NTFP sales (inserted in 6.1) and corrected this for the fact that a share of income from agriculture (as indicated in 1.3) contributes to total income (this has resulted in at least one suspicious income level, see below).
- For many products (esp. Mexican), the database for NTFP households is internally consistent: the sum in 1.3 equals 6.1 (Cocoa silvestre, Palma tepejilote, Brahea dulcis, Maguey, Pita, and Hongos); and NTFP sales in 5.2 equals NTFP income in 1.3. This is important, because it gives us more confidence in the data. Sometimes however there are inconsistencies or incomplete data: we usually take income (share or totals) data from 1.3.
- NTFP sales appear to have been estimated on average sales (total volume\*typical price) in many instances; NTFP costs are often an indication (calculated ex post) and so NTFP value added data need to be treated with caution.
- Data given in 1.3 provide quite a good picture of income for most products, particularly the Mexican products.
- We have not taken into account in value added measures the extent to which NTFPs are consumed – this can add up to 10% for some products.

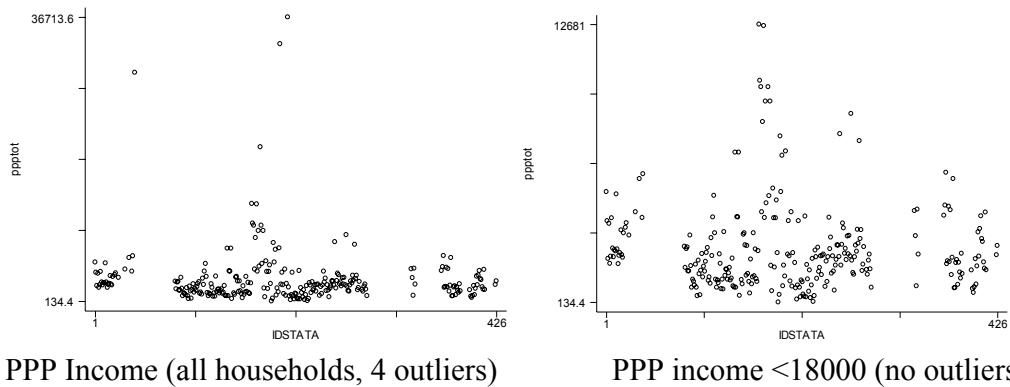
The results with data on total, cash and NTFP income levels (in domestic currency) are given in table 1. Information relates to the mean, standard deviation and number of observations. The following observations can be made:

- The mean total and cash income of households involved in NTFP is highest for Incense and Goma (Tomachi) in Bolivia and Brahea dulcis, Hongos and Maguey in Mexico.
- However, note that these products also have a high standard deviation. This indicates either that there is a lot of general dispersion or that there are outliers. If outliers exist, this can mean that there are errors or that some people are doing particularly well. The latter appears to be the case for Incense and Brahea dulcis (two people involved in sombreros). Chart 1 indicates that there are only four such outliers: two for Brahea dulcis and one each for Incense and Goma. We should treat some of these with caution.

**Table C1 Summary data on income, sales, and NTFP value added for households involved in NTFP**

	Total income			Cash Income			NTFP income			NTFP value added		
	Mean	Std. Dev.	No of obs	Mean	Std. Dev.	No of obs	Mean	Std. Dev.	No of obs	Mean	Std. Dev.	No of obs
<b>Bolivia(bolivianos):</b>												
Incienso (Pucasucho)	24585	28991	7	20743	22850	7	13029	4006	7	13029	4006	7
Cacao (Carmen del Fmero)	8496	2883	23	3418	3372	23	1420	2185	21	893	708	22
Cacao (San Silvestre)	4567	2291	14	2973	2052	14	255	150	14	255	150	14
Goma (Santa Rosa de Challana)	6386	4523	24	6300	4272	18	4066	3571	24	4062	3572	24
Goma (Tomachi)	27968	13443	13	25118	14619	13	13213	8680	15	13213	8680	15
Jipi Japa (Buenavista)	na			8027	5401	9	2041	1035	8	1663	1089	8
Jipi Japa (Candelaria)	na			4714	2011	14	2431	736	14	2241	743	14
Jipia Japa (El Carmen Surutu)	na			3479	2573	11	2599	2051	13	2167	1884	13
Jipi Japa (Potrero San Rafael)	na			9007	7123	6	2265	1430	6	2145	1480	6
<b>Mexico (mesos):</b>												
Palma Camedora (Monte Tinta)	13554	7746	24	8761	5094	24	1461	1223	24	1461	1223	24
Brahea Dulcis (La Esneranza)	37038	56377	16	37008	56379	16	27914	57248	16	26414	57537	16
Brahea Dulcis (Tonilteneo)	23385	56915	20	23185	56908	20	16576	55945	20	15239	55054	18
Hongos (Cuauimovolas)	24236	15523	13	22619	15766	13	1174	984	13	1174	984	13
Hongos (Latuvi)	17639	4674	13	13761	4756	13	2483	1567	12	2483	1567	12
Maguey (La Esneranza)	18863	8264	3	18783	8362	3	12613	2685	3	12613	2685	3
Maguey (Tonilteneo)	8757	8199	9	8257	7007	9	2033	1869	9	1340	1040	8
Palma Tepejilote (Tilteneo)	12875	11050	15	4933	2793	15	1480	2456	15	1480	2456	15
Palma Tepejilote (Yaavila)	11567	3699	6	7740	2924	6	1508	1822	6	1508	1822	6
Pita (Agua Pescadito)	22820	16097	6	12272	10338	6	1450	1400	6	1450	1400	6
Pita (Arroyo Blanco)	14005	5555	21	10198	4158	21	2390	1250	20	2390	1250	20

**Chart C1 Checking for outliers in PPP Total Income:**



- The dispersion amongst products-community combinations (standard deviation / mean) is larger for NTFP income and value added than for total income measures. This confirms the heterogeneity of NTFPs in the sample: NTFPs should not be grouped together, with some generating a lot of income while others do not.

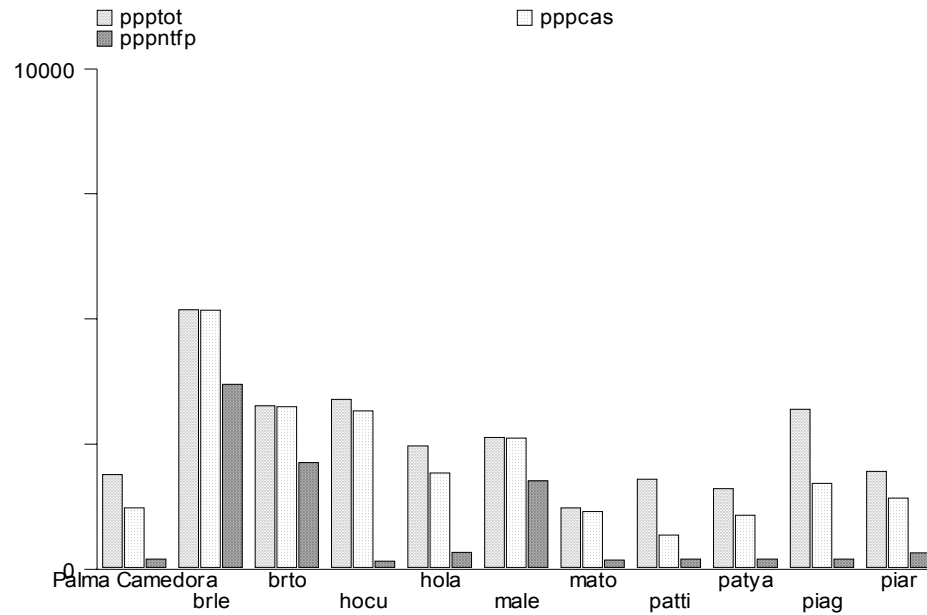
**Std. Dev / Mean for households involved in NTFPS activities**

	Total income	Cash income	Ntfp income	Ntfp Value added
Mexico	0.43	0.62	1.37	1.36
Bolivia	0.76	0.87	1.08	1.15

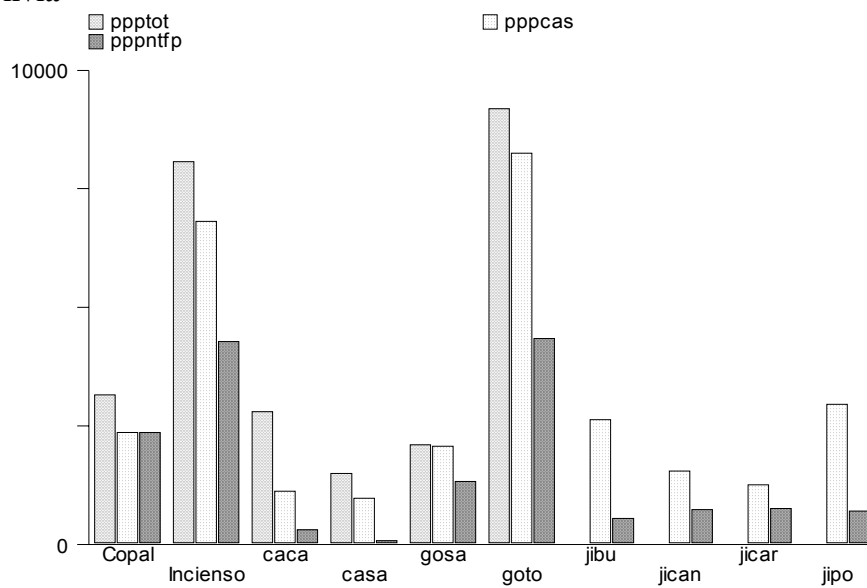
- Chart 2 provides data for Mexico and Bolivia. It is clear that rankings by income level would be different than ranking by NTFP value added. In many instances, NTFPs provide only a small percentage of total or cash income. This will be explored in further analysis.

**Chart C2 Total income, Cash income, NTFP value added (ppp \$)  
By product and community combinations**

**Mexico:**



**Bolivia**



- The value added data can be used to construct very basic production measures per household (in a sense they also reflect productivity): value added per household month traded (table C2). The dispersion of NTFP value added across products (se/mean) decreases to 0.77 (Mexico) and 1.08 (Bolivia).

**Table C2 Production of NTFPs (per average household month)**

	Mean NTFP value added (dom. currency)	Months traded per year	Value added per month	Value added per month (US\$)	Value added per month (PPP \$)
<b>Bolivia</b>					
Incienso (Pucasucho)	13029	12	1086	149	372
Cacao (Carmen del Emero)	893	4.4	203	28	70
Cacao (San Silvestre)	255	5.8	44	6	15
Goma (Santa Rosa de Challana)	4062	11.3	359	49	123
Goma (Tomachi)	13213	10.6	1247	171	427
Jipi Japa (Buenavista)	1663	11.9	147	20	50
Jipi Japa (Candelaria)	2241	11.3	198	27	68
Jipia Japa (El Carmen Suru)	2167	10.9	199	27	68
Jipi Japa (Potrero San Rafael)	2145	12	179	24	61
<b>Mexico</b>					
Palma Camedora (Monte Tinta)	1461	5.8	252	25	35
Brahea Dulcis (La Esmeranza)	26414	12	2201	220	308
Brahea Dulcis (Tonilteneec)	15239	12	1270	127	178
Hongos (Cuauimovolas)	1174	2	587	59	82
Hongos (Latuvi)	2483	2	1242	124	174
Maguey (La Esmeranza)	12613	6.7	1883	188	264
Maguey (Topiltepec)	1340	7.3	184	18	26
Palma Tepejilote (Tilteneec)	1480	3.7	400	40	56
Palma Tepejilote (Yaavila)	1508	3.7	408	41	57
Pita (Agua Pescadito)	1450	2.7	537	54	75
Pita (Arroyo Blanco)	2390	3.5	683	68	96

Value added per month, or productivity measures do not tell us whether products are profitable or which factor of production gets the return. For this we would need to compute labour return, which would require two pieces of information:

- What is the precise labour input?
- What are the other costs (transaction, transportation, capital, other). *It seems that the data on costs are less reliable than income data, suggesting that we need to work with assumptions and data sources other than the database (e.g. community and market reports) and that uncertainty in the analysis enters in this stage.*

Once calculated, factor returns can be compared with factor returns in other activities. We do not attempt to address this here, but it could be addressed elsewhere to see whether (labour) returns from NTFP activities compare well with other activities (e.g. wage labour).

## Appendix D: The location of NTFP households in well-being rankings

Are NTFP households amongst the poorest or are they ranked in bottom categories within communities? We asked communities to divide households involved in NTFP activities into different well-being categories (as a proxy for poverty). These categories are based on locally defined criteria, including land area, remittance income, number of active adults, type of house and others. The criteria can vary from one community to the next and do not reflect the same absolute levels (and are described elsewhere). It would thus be difficult to compare the location of NTFP households in the well-being distribution across communities to assess whether they are ranked in the top or bottom categories.

Some communities use 3 well-being categories, others 4 categories. The number and distribution over well-being categories of all (NTFP and non-NTFP) households is known and is shown in the left part of table 1. There is no reason to assume that there should be an equal number of households in each category. However, if there is something special about NTFP households with respect to well-being, the distribution over well-being groups of *all* households is different from the distribution of *NTFP only* households.

We exclude communities where all or almost all households are involved in NTFP activities: Santa Rosa, San Silvestre, Carmen del Emero La Esperanza and Topiltepec. Any difference in the well-being rankings of all households and NTFP households in these communities would reflect a non-random sample of NTFP households across well-being categories. And this would not answer whether NTFP households are amongst the poorest *within* communities because *all* households are involved in NTFP activities.

Table D1 Number of households by well-being category

Community	All households					NTFP households (sample)					All NTFP households TOTAL
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	
Agua Pescadito	10	40	80	50	180	2	1	3	0	6	6
Arroyo Blanco	22	75	34		131	1	16	11		28	70
Candelaria and Buenavista						0	13	10		23	25
Cuajimoloyoas	3	3	103	40	149	0	0	8	5	13	13
El Carmen Surutu	6	5	13	96	120	0	5	8	0	13	23
Latuvi	5	15	9	72	101	0	0	3	10	13	20
Monte Tinta	15	30	45		90						
Potrero	7	21	5		33	0	4	2		6	15
Pucasucho	12	18	15		45	7	15	1		23	31
Tiltepec	3	14	18		35	1	6	8		15	20
Tomachi	20	57	63		140	1	12	2		15	15
Yagavila						0	3	3		6	8

The number of NTFP households is given by well-being category in the right part of table 1. NTFP households are drawn such that they represent stages as well as well-being groups from each community. In principle, this strategy will affect the distribution of households over well-being groups. However, in practice this does not matter when the sample of NTFP households is similar to the total number of NTFP households. The

number of sample NTFP households is low in Agua Pescadito, Potrero and Yagavila, and much lower than the total number of NTFP households in Arroyo Blanco, so we need to be careful in interpreting results for these communities.

We compute the distribution of all and NTFP households across well-being groups by taking the proportion of households in each well-being group. To assess the location of NTFP households in well-being rankings we take for each well-being group the difference in proportions between NTFP households and all households. Table 2 provides the results.

The interpretation of results for Potrero is as follows. The difference in proportion for group 1 is (-) 0.21 ( $=0/6 - 7/33$ ). In other words, the proportion of NTFP households in group 1 is 0.21 lower than the proportion of all households in group 1: there is a 21 percentage point difference. However, the proportion of NTFP households in group 2 and 3 is 0.03 and 0.18 higher than the proportion of all households in group 2 and 3. This implies that NTFP households are more likely to be located in group 2 and 3 compared to all households together, but less likely in group 1. Therefore NTFP households in Potrero are relatively poor.

**Table D2 Location of NTFP households in well-being rankings**

Community	Proportion of households by wellbeing category (NTFP households - all households)				Number of households		Product
	1 (rich)	2	3	4 (poor)	NTFP households (sample)	All	
<b>Concentration of NTFP households in top rankings</b>							
Agua Pescadito	0.28	-0.06	0.06	-0.28	6	180	Pita
Pucasucho	0.04	0.25	-0.29		23	45	Inc/Copal
<b>Concentration of NTFP households ranked at bottom</b>							
Potrero	-0.21	0.03	0.18		6	33	Jipi Japa
Latuvi	-0.05	-0.15	0.14	0.06	13	101	Hongos
Cuajimoloyas	-0.02	-0.02	-0.08	0.12	13	149	Hongos
Tiltepec	-0.02	0.00	0.02		15	35	Palma tepejilote
Arroyo Blanco	-0.13	0.00	0.13		28	131	Pita
<b>Concentration of NTFP households in middle rankings</b>							
Tomachi	-0.08	0.39	-0.32		15	140	Goma
El Carmen Surutu	-0.05	0.34	0.51	-0.80	13	120	Jipi Japa

One can draw the following conclusions:

- NTFP households are ranked amongst the bottom rankings in 5 communities (Potrero, Latuvi, Cuajimoloyas, Tiltepec, Arroyo Blanco), but amongst the top rankings in only 2 communities (Agua Pescadito) and amongst the middle rankings in 2 other communities (Tomachi and El Carmen Surutu).
- While NTFP households are relatively poor, there is variation amongst communities and it would need further work to see whether this is due to

heterogeneity in products or communities. For instance, why are households involved in Incense/Copal relatively well off within their community: is this because of lack of other income opportunities or because the product requires skills and capital. Similarly, Pita households are amongst the top rankings in Agua Pescadito (however note low number of households) but bottom rankings in Arroyo Blanco.

- NTFP households are neither only wealthy (see large number of households in group 2 for Pucasucho) nor only poor (see large number of households in group 2 for Arroyo Blanco).

## **Appendix E Economic success in NTFP activities: product, community or individual effect? Evidence for NTFP households**

Are households productive in the use of a particular NTFP product because the products they trade have great potential, because the communities provide a favourable environment, because the households have great appropriate and good quality skills, or because of some combination of these factors? This is a crucial question in current research on NTFP activities. Preliminary insights can be found by examining the variation in productivity across products, communities and households. While this can be done using statistical testing, we have opted to provide a visual overview. The main conclusion is that there is great variety in productivity (value added per month) across NTFP households, even within products and/or communities.

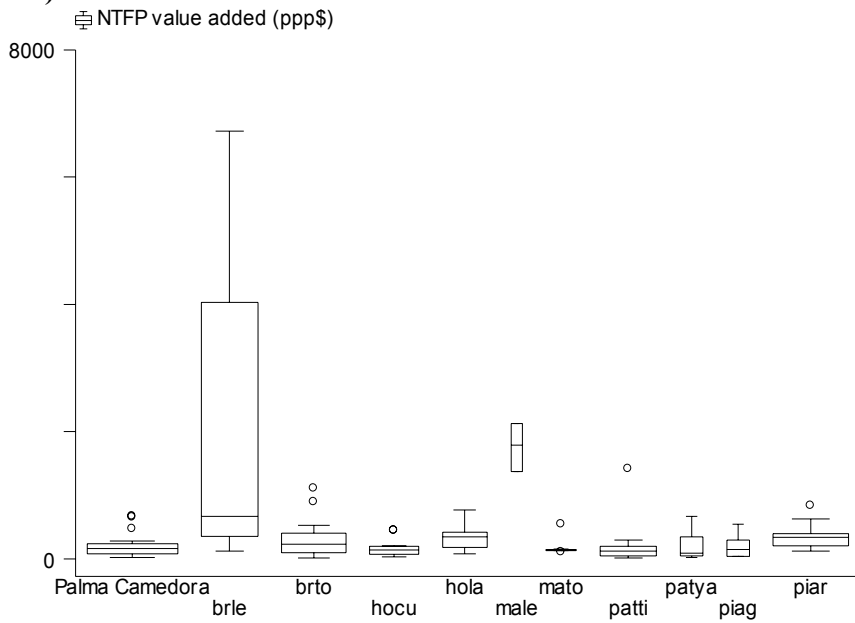
Charts 1 and 2 provide information on value added per household (ppp dollars) in Mexico and Bolivia by product/community combination. The main charts provide a box and whisker plot. The line in the middle of the box represents the median or 50<sup>th</sup> percentile of the data. The box extends from the 25<sup>th</sup> percentile to the 75<sup>th</sup> percentile. Observed points that are more extreme than the adjacent values are individually plotted. The plots at product level graph the share of NTFP in cash income against total value added (on the whole the higher the value added, the higher the share).

The following observations can be made:

- At the product level, Goma and Incense are higher value added products than other products in Bolivia; Brahea dulcis and Maguey are more profitable products than other products in Mexico. The differences are statistically different.
- At the community level, some communities are more profitable with the same products: Tomachi obtains more value added from Goma than Santa Rosa. La Esperanza obtains significantly more value added from Maguey and Brahea dulcis compared to Topiltepec: hence, there is some variation in performance due to community effects (or distribution of individual characteristics over communities).
- Finally, variation of NTFP performance at household level is pervasive for all communities and products. For a range of products, the variation at individual level is greater than the variety in mean/median across product/community combinations. This is only partly because the NTFP household group includes different type of actors (as long as they live and work inside the community).
- In particular, variation for Goma households spans almost all variation in medians across products. Two individuals stand out for Brahea dulcis, and a few households stand out in the case of Palma tepejilote and Maguey. For all other products there is genuine variation, and further analysis would need to establish why. What is clear however, is that productivity with NTFP products does not only depend on the type of product that is traded or the type of community in which the household is located, but also individual household level characteristics.

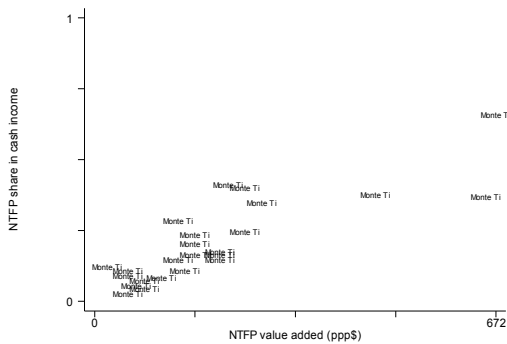


## Chart E2 Value added per household by product-community combination (ppp dollars) Mexico

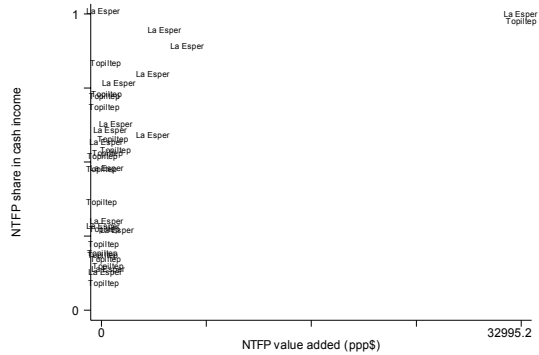


Share NTFP in cash income vs NTFP value added: (individual households are plotted by the community in which they are living)

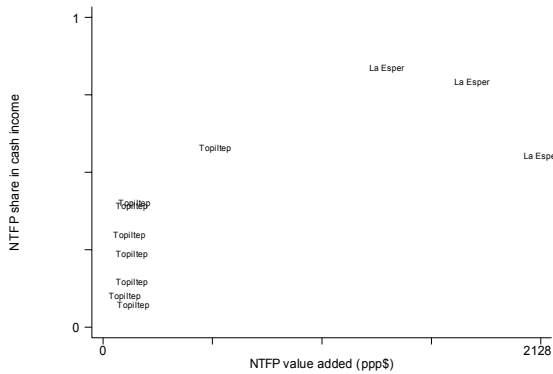
### Palma Camedora



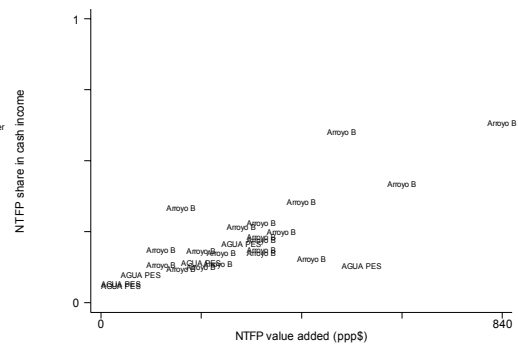
### Brahea Dulcis



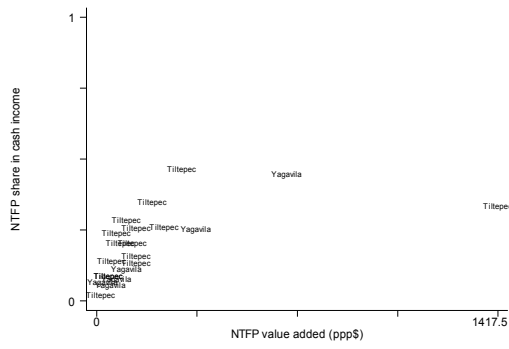
### Maguey



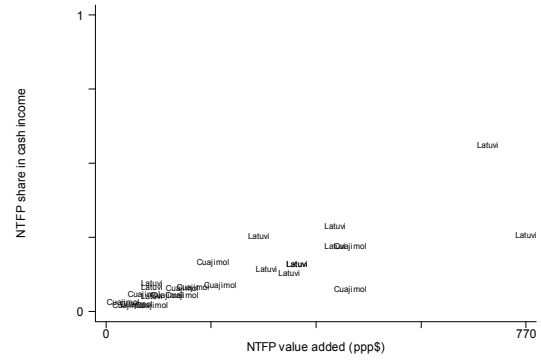
### Pita



## Palma Tepejilote



## Hongos



## Appendix F: Agriculture subsidies in Mexico: do they reduce NTFP activity?

In contrast to Bolivians, the Mexicans receive a number of subsidies (Procampo, Progresa, Semarnat) many of which are aimed at stimulating agricultural production. A question that arises is whether these subsidies are discouraging NTFP activities because they aim to raise agricultural income (or subsistence converted into cash equivalent) reducing the need for other income. Unfortunately, the answer does not appear to be that simple. Further analysis may need to examine the impact of specific subsidies more closely (not all subsidies work in the same way).

The pie charts below provide a breakdown of income by type: subsidies, agriculture, NTFP activity and other (work, remittances, etc.). On these data, the share of agricultural income varies from 0% in the case of households involved in Maguey and Brahea dulcis to 45% in the case of Pita and Palma tepejilote. Subsidies vary to the same extent. Where agriculture income and subsidies are high (low), NTFP income appears to be low (high).

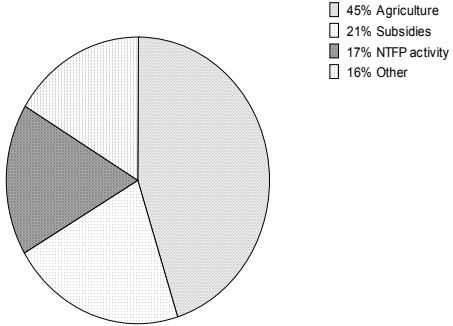
Chart 2 plots the share of income in subsidies against the share of income derived from NTFP activities. Clearly, at product level higher subsidies are associated with higher agriculture income shares but lower NTFP income shares. However, there are two pieces of evidence that show that NTFP income is not simply a substitute. First, one would expect “controls” who are not involved in NTFP trade to have higher subsidies, but there is insufficient evidence for this, see table 1 below. Second, there is a low and mostly positive correlation between subsidies and NTFP income (see final rows). Hence, on this basis lower subsidies do not lead to higher NTFP income, suggesting that NTFP income can be seen as additional to agriculture income and not a substitute.

**Table F1 Average subsidy per household (Pesos).**

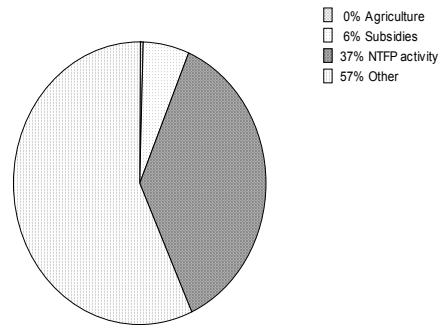
	Hongos	Palma Camedora	Palma Tepejilote	Pita
NTFP households	3170	4158	3774	6951
Controls		4303	3486	5053
P-value for difference	0.01	0.90	0.73	0.15
Correlation (subsidies-agriculture) for NTFP households	0.45	0.51	0.24	0.11
Correlation (subsidies-ntfp income) for NTFP households	0.28	-0.11	0.07	0.30

**Chart F1 Income shares of various activities.**

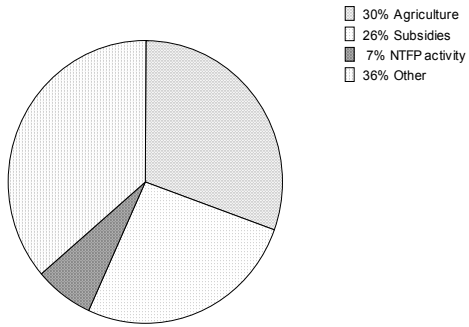
Pita



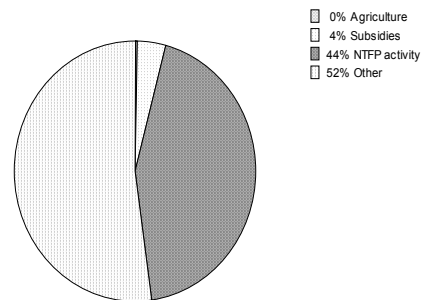
Maguey



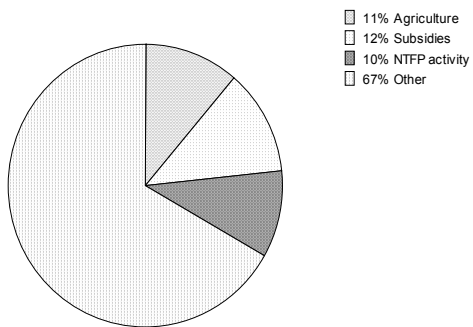
Palma Camedora



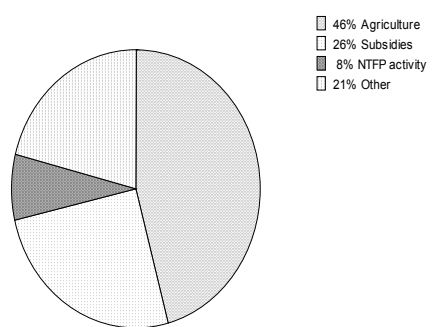
Brahea Dulcis



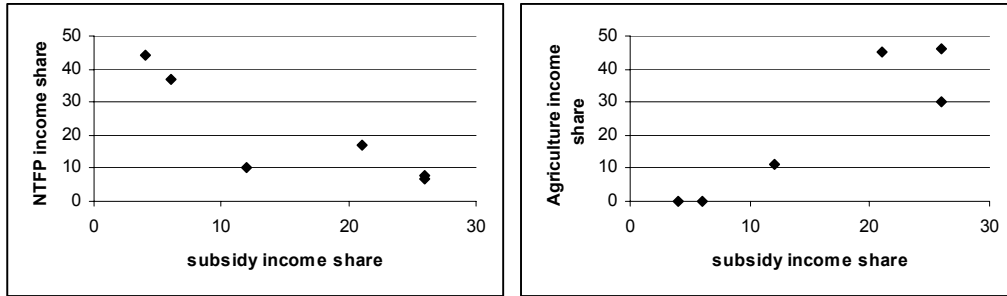
Hongos



Palma Tepejilote



**Chart F2 Higher subsidies, higher agriculture income, less NTFP income?**



Based on 6 Mexican products.

## Appendix G Variation in quantity sold and unit value

The database can be used to determine at the household level the quantities sold for most products and the unit value received when sold. We have seen in appendix E that there is a lot of variation in individual value added. This appendix shows that most variation in household performance seems to be due to variation in the quantity sold rather than the unit value charged (we use the NTFP household group). This will be done using charts.

Each chart plots the relationship between the quantity sold and the unit value charged. The variables are in natural logs, so a movement from 3 to 4 is a 100% difference in volumes or prices. Each household is plotted by the community where they live. We have obtained data for Cacao, Hongos, Incense, Maguey, Palma camedora, Palma tepejilote and Pita. There is a possibility that outliers are based on errors in the data on values or volumes.

The percentage variation in volumes is larger than the variation in unit value for Cacao, Hongos (within the separate communities) and very clearly for Palma camedora, Palma tepejilote and Pita. It appears that the latter three are based on a single unit value. There is no clear cut interpretation for Incense, while price variation is stronger for Maguey.

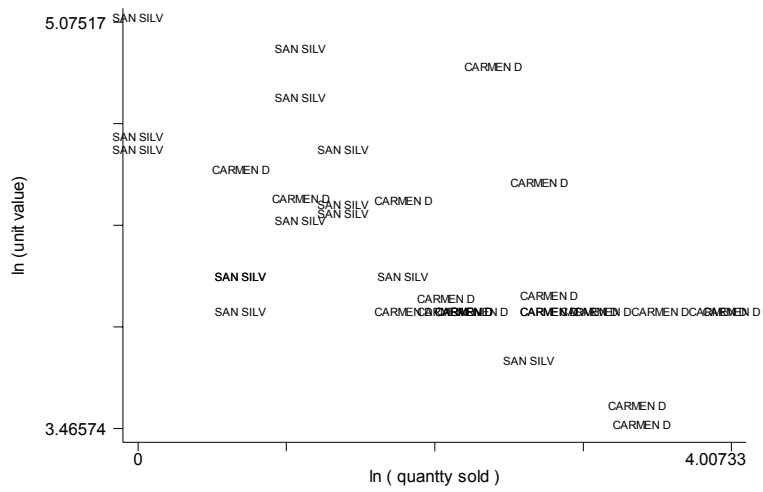
The charts also indicate that prices are set at some fixed level for Hongos in Cuajimoloyas, Palma camedora and Palma tepejilote in Yagavila, suggesting that households have little influence over the price. These products are also amongst the weakest in terms of revenue generation.

For other products such as Cacao silvestre, Hongos in Latuvi and Maguey it appears that quantity and price interact. As expected, the higher the unit value the fewer products can be sold. These products do relatively well in terms of generating money.

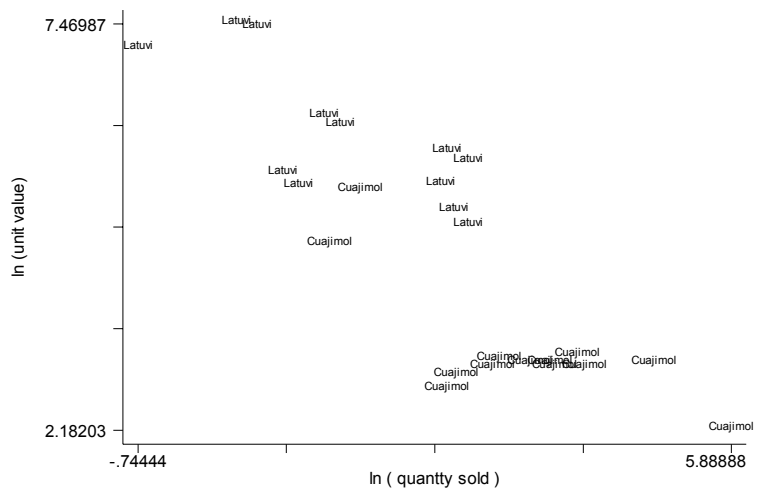
Units used:

Cacao	arrobas
Inc/Copal	arrobas
Palma Camedora	gruesas
Palma Tepejilote	manojos
Maguey	cabezas
Pita	Kg
Hongos	Kg

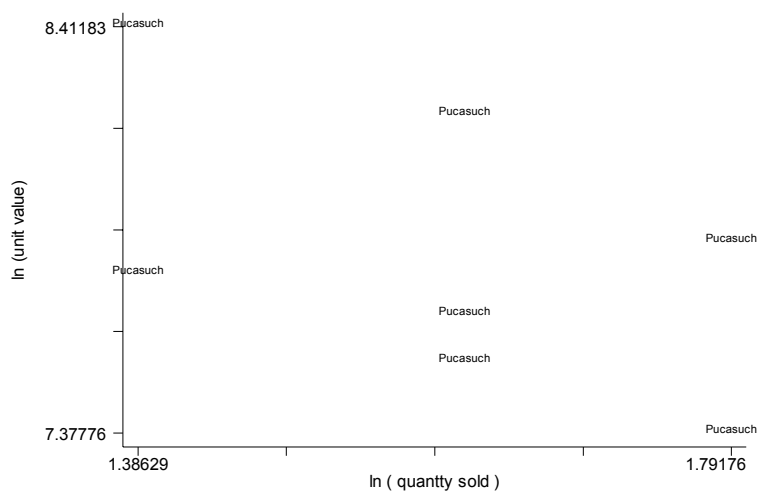
**Chart G1 Volume sold versus unit value charged, by household: Cacao silvestre**



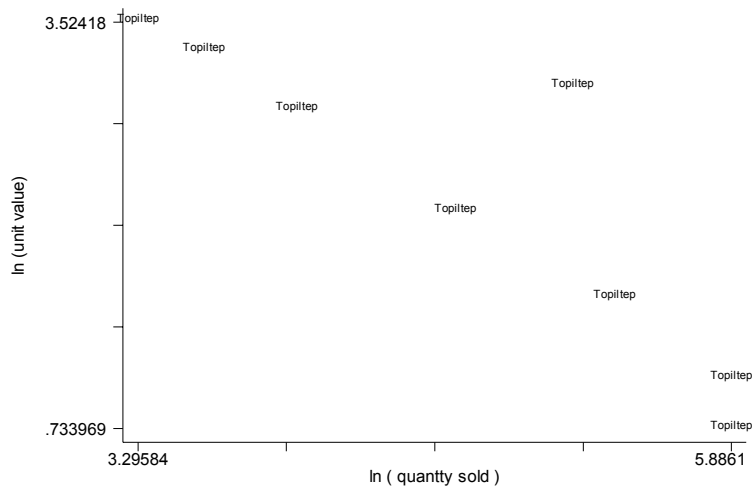
**Chart G2 Volume sold versus unit value charged, by household: Hongos**



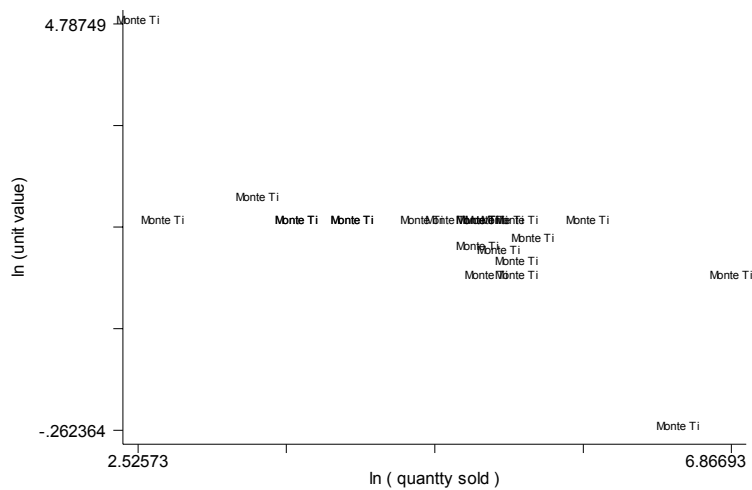
**Chart G3 Volume sold versus unit value charged, by household: Incense**



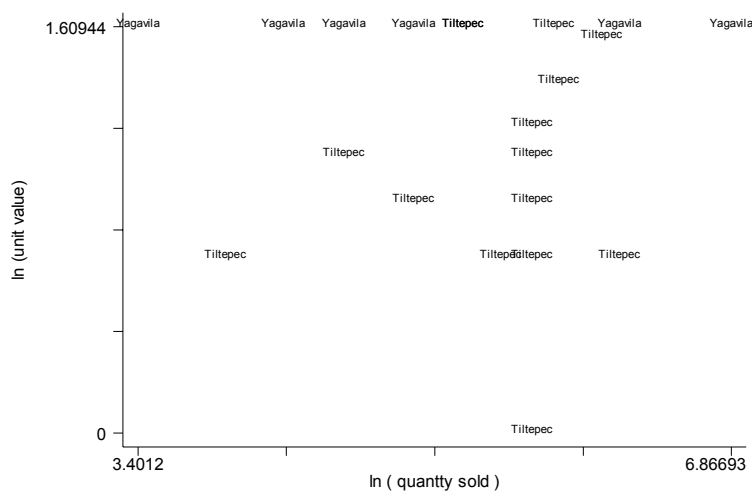
**Chart G4 Volume sold versus unit value charged, by household: Maguey**



**Chart G5 Volume sold versus unit value charged, by household: Palma Camedora**

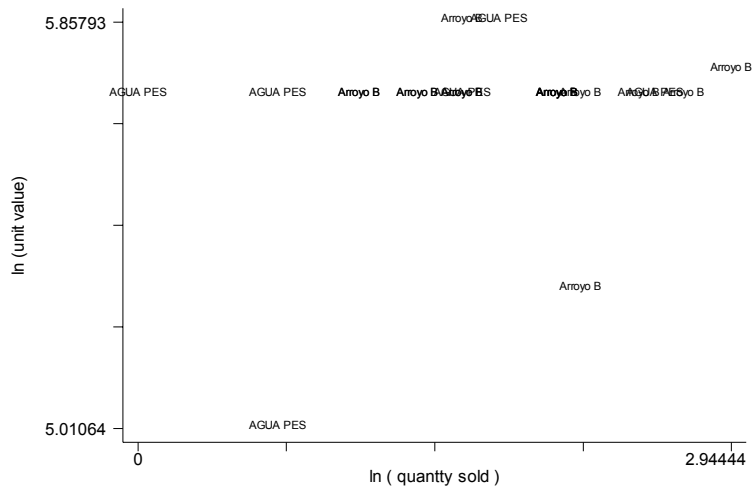


**Chart G6 Volume sold versus unit value charged, by household: Palma tepejilote**



#

**Chart G7 Volume sold versus unit value charged, by household: Pita**



## Appendix H Correlations between measures of success, NTFP households

Success at household/trader level

Lnppva = Ln of value added derived from NTFPs, ppp dollars

Sharesub = Share of income (cash and subsistence income) derived from NTFP

Liveli = How important have NTFPs been in your livelihood strategy (question 6.7)

Succ66 = How successful do regard yourself (question 6.6)

Success = How successful do you consider yourself compared with your peers (question 6.5)

**Table H1 Summary table on correlations amongst various measures of success.**

	Success – Livelihood	Success – Success 6.6	Success – value added	Success – share
Copal (Pucasucho)	-	-	na	Na
Inciense (Pucasucho)	√√	-	na	Na
Palma Camedora (Monte Tinta)	√√	√√	√√	√√
Brahea Dulcis (La Esperanza)	√√	√	-	√√
Brahea Dulcis (Topiltepec)	-	-	-	-
Cacao (Carmen del Emero)	-	-	-	-
Cacao (San Silvestre)	√√	√√	-	√√
Goma (Santa Rosa de Challana)	na	na	Na	Na
Goma (Tomachi)	na	√√	-	-
Hongos (Cuajimoyolas)	-	√√	√√	√√
Hongos (Latuvi)	-	√√	√√	√√
Jipi Japa (Buenavista)	-	-	Na	-
Jipi Japa (Candelaria)	-	√	Na	-
Jipi Japa (El Carmen Surutu)	-	√√	Na	-
Jipi Japa (Potrero San Rafael)	-	√√	Na	-
Maguey (La Esperanza)	na	Na	Na	Na
Maguey (Topiltepec)	na	Na	Na	Na
Palma Tepejilote (Tiltepec)	-	-	-	-
Palma Tepejilote (Yagavila)	-	-	-	-
Pita (Agua Pescadito)	√	-	√√	√
Pita (Arroyo Blanco)	-	√√	-	-

√√ 5%

√ 10%

na not available

“ “ no significant correlation

## Correlations amongst measures by product/ community combination

### **Copal**

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	10				
liveli	0.3563	1.0000			
	0.3122	10			
suc66	0.2182	0.0000	1.0000		
	0.5447	1.0000	10		
sharesub	.	.	.	1.0000	
	1.0000	1.0000	1.0000	0	
lnpppva	.	.	.	.	1.0000
	1.0000	1.0000	1.0000	1.0000	0

### **Incienso**

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	21				
liveli	0.5859	1.0000			
	0.0066	20			
suc66	0.3686	0.1594	1.0000		
	0.1001	0.5019	21		
sharesub	.	.	-0.2983	1.0000	
	1.0000	1.0000	0.5159	7	
lnpppva	.	.	0.9777	-0.3384	1.0000
	1.0000	1.0000	0.0001	0.4579	7

### **Palma Camedora**

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	27				
liveli	0.5314	1.0000			
	0.0052	26			
suc66	0.5238	0.4217	1.0000		
	0.0050	0.0319	27		
sharesub	0.4836	0.3958	0.5867	1.0000	
	0.0167	0.0556	0.0026	24	
lnpppva	0.5515	0.4098	0.7763	0.7687	1.0000
	0.0035	0.0376	0.0000	0.0000	26

### Brahea Dulcis (La Esperanza)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	14				
liveli	0.6417 0.0134 14	1.0000 16			
suc66	0.4951 0.0719 14	0.5345 0.0329 16	1.0000 16		
sharesub	0.3208 0.2635 14	-0.0059 0.9827 16	-0.2618 0.3274 16	1.0000 16	
lnpppva	0.7889 0.0008 14	0.6506 0.0064 16	0.4017 0.1231 16	0.5680 0.0217 16	1.0000 16

### Brahea Dulcis (Topiltepec)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	20				
liveli	0.1683 0.4780 20	1.0000 20			
suc66	-0.1572 0.5079 20	-0.1147 0.6301 20	1.0000 20		
sharesub	0.2106 0.3729 20	-0.2977 0.2024 20	-0.3886 0.0904 20	1.0000 20	
lnpppva	0.0453 0.8583 18	-0.0446 0.8605 18	-0.1749 0.4875 18	0.4876 0.0401 18	1.0000 18

### Cacao (Carmen del Emero)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	22				
liveli	0.0642 0.7767 22	1.0000 22			
suc66	0.2523 0.2572 22	0.1561 0.4879 22	1.0000 22		
sharesub	-0.2759 0.2391 20	0.1403 0.5552 20	-0.0053 0.9824 20	1.0000 21	
lnpppva	0.0125 0.9582 20	0.2174 0.3573 20	-0.0641 0.7884 20	0.6227 0.0026 21	1.0000 21

### Cacao (San Silvestre)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	14				
liveli	0.5908 0.0261 14	1.0000 14			
suc66	0.6389 0.0139 14	0.3536 0.2149 14	1.0000 14		
sharesub	0.2654 0.3591 14	0.0541 0.8543 14	0.3838 0.1755 14	1.0000 14	
lnpppva	0.5827 0.0288 14	0.5116 0.0615 14	0.4666 0.0926 14	0.5175 0.0581 14	1.0000 14

### Goma (Santa Rosa)

	success	liveli	suc66	sharesub	lnpppva
success	.				
	23				
liveli	. 1.0000 0	. 0			
suc66	. 23	. 1.0000 0	. 1.0000 23		
sharesub	. 1.0000 23	. 1.0000 0	. 1.0000 23	1.0000 24	
lnpppva	. 1.0000 23	. 1.0000 0	. 1.0000 23	0.3380 0.1062 24	1.0000 24

### Goma (Tomachi)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	15				
liveli	. 1.0000 5	. 5			
suc66	0.6814 0.0052 15	. 1.0000 5	1.0000 15		
sharesub	0.1556 0.6116 13	. 1.0000 3	-0.1739 0.5699 13	1.0000 13	
lnpppva	0.3323 0.2262 15	. 1.0000 5	0.2131 0.4457 15	0.6810 0.0104 13	1.0000 15

### Hongos (Cuajimoloyas)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	13				
liveli	0.3750 0.5340 5	1.0000 5			
suc66	0.7206 0.0055 13	0.3750 0.5340 5	1.0000 13		
sharesub	0.7701 0.0021 13	0.1908 0.7585 5	0.8050 0.0009 13	1.0000 13	
lnpppva	0.5671 0.0433 13	0.3563 0.5561 5	0.5272 0.0641 13	0.7709 0.0020 13	1.0000 13

### Hongos (Latuvi)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	13				
liveli	-0.2000 0.5331 12	1.0000 12			
suc66	0.6325 0.0273 12	-0.3750 0.2558 11	1.0000 12		
sharesub	0.8665 0.0003 12	-0.0921 0.7877 11	0.6058 0.0482 11	1.0000 12	
lnpppva	0.7875 0.0024 12	-0.3957 0.2283 11	0.9327 0.0000 11	0.8039 0.0016 12	1.0000 12

### Jipi Japa (Buenavista)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	9				
liveli	0.3536 0.3506 9	1.0000 9			
suc66	0.4588 0.2141 9	0.4056 0.2788 9	1.0000 9		
sharesub	. 1.0000 0	. 1.0000 0	. 1.0000 0	. 0	
lnpppva	0.2908 0.4846 8	0.0562 0.8948 8	0.6670 0.0708 8	. 1.0000 0	1.0000 8

### Jipi Japa (Candelaria)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	13				
liveli	0.0220 0.9432 13	1.0000 14			
suc66	0.5353 0.0594 13	0.1731 0.5540 14	1.0000 14		
sharesub	. 1.0000 0	. 1.0000 0	. 1.0000 0	. 0	
lnpppva	-0.1562 0.6103 13	-0.1799 0.5382 14	0.1838 0.5294 14	. 1.0000 0	1.0000 14

### Jipi Japa (El Carmen Surutu )

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	13				
liveli	0.3804 0.1997 13	1.0000 13			
suc66	0.6565 0.0148 13	0.6556 0.0150 13	1.0000 13		
sharesub	. 1.0000 0	. 1.0000 0	. 1.0000 0	. 0	
lnpppva	0.4470 0.1256 13	0.4983 0.0831 13	0.4514 0.1215 13	. 1.0000 0	1.0000 13

### Jipi Japa (Potrero)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	6				
liveli	-0.3162 0.5415 6	1.0000 6			
suc66	0.8660 0.0257 6	0.0000 1.0000 6	1.0000 6		
sharesub	. 1.0000 0	. 1.0000 0	. 1.0000 0	. 0	
lnpppva	0.5975 0.2104 6	0.0405 0.9393 6	0.7952 0.0586 6	. 1.0000 0	1.0000 6

### Maguey (La Esperanza)

	success	liveli	suc66	sharesub	lnpppva
success	.				
	3				
liveli	.	.			
	1.0000				
	3	3			
suc66	.	.	1.0000		
	1.0000	1.0000			
	3	3	3		
sharesub	.	.	-0.5727	1.0000	
	1.0000	1.0000	0.6118		
	3	3	3	3	
lnpppva	.	.	0.9198	-0.8484	1.0000
	1.0000	1.0000	0.2567	0.3552	
	3	3	3	3	3

### Maguey (Topiltepec)

	success	liveli	suc66	sharesub	lnpppva
success	.				
	9				
liveli	.	.			
	1.0000				
	9	9			
suc66	.	.	1.0000		
	1.0000	1.0000			
	9	9	9		
sharesub	.	.	0.3673	1.0000	
	1.0000	1.0000	0.3309		
	9	9	9	9	
lnpppva	.	.	0.1959	0.7063	1.0000
	1.0000	1.0000	0.6420	0.0502	
	8	8	8	8	8

### Palma Tepejilote (Tiltepec)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	15				
liveli	-0.0356	1.0000			
	0.8998				
	15	15			
suc66	0.6469	0.0334	1.0000		
	0.0092	0.9059			
	15	15	15		
sharesub	-0.1940	0.6640	-0.1497	1.0000	
	0.4885	0.0069	0.5943		
	15	15	15	15	
lnpppva	-0.1635	0.7100	-0.1062	0.8494	1.0000
	0.5604	0.0030	0.7065	0.0001	
	15	15	15	15	15

### Palma tepejilote (Yagavila)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	6				
liveli	0.5000 0.3125 6	1.0000 6			
suc66	0.5000 0.3125 6	0.2500 0.6328 6	1.0000 6		
sharesub	0.4062 0.4242 6	0.9654 0.0018 6	0.3448 0.5033 6	1.0000 6	
lnpppva	0.2588 0.6205 6	0.8960 0.0157 6	0.4098 0.4197 6	0.9487 0.0039 6	1.0000 6

### Pita (Agua Pescadito)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	6				
liveli	0.7906 0.0612 6	1.0000 6			
suc66	. 1.0000 6	. 1.0000 6	. 6		
sharesub	0.7540 0.0834 6	0.6755 0.1409 6	. 1.0000 6	1.0000 6	
lnpppva	0.8125 0.0494 6	0.4392 0.3835 6	. 1.0000 6	0.7780 0.0685 6	1.0000 6

## Pita (Arroyo Blanco)

	success	liveli	suc66	sharesub	lnpppva
success	1.0000				
	22				
liveli	-0.0482	1.0000			
	0.8312				
	22	22			
suc66	0.4276	-0.2664	1.0000		
	0.0471	0.2308			
	22	22	22		
sharesub	0.3470	0.3434	0.3287	1.0000	
	0.1339	0.1383	0.1571		
	20	20	20	20	
lnpppva	0.2526	0.3487	0.3113	0.7093	1.0000
	0.2827	0.1318	0.1815	0.0005	
	20	20	20	20	20