

Part 3

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# **Annexes**

# Annex 1

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# Annex 2

## Questionnaire Used in the Field Surveys (English Version)

Name of the Household \_\_\_\_\_

Family Size \_\_\_\_\_

Village \_\_\_\_\_

### 1. General Information

#### 1A. Information on Climate

i. What is the altitude of the area? \_\_\_\_\_

ii. Agroclimatic conditions of the area (farmers' perceptions)

a. Temperature, in winter \_\_\_\_\_, in spring \_\_\_\_\_  
in summer \_\_\_\_\_, rainy season \_\_\_\_\_

b. Humidity, in winter \_\_\_\_\_, in spring \_\_\_\_\_  
in summer \_\_\_\_\_, rainy season \_\_\_\_\_

c. Rainfall, in winter \_\_\_\_\_, in spring \_\_\_\_\_  
in summer \_\_\_\_\_, rainy season \_\_\_\_\_

iii. When do you have snowfall? In winter? \_\_\_\_\_

a. \_\_\_\_\_ (month) before apple flowering,

b. \_\_\_\_\_ (month) during apple flowering

c. \_\_\_\_\_ (month) after fruit set

iv. What kind of change do you feel in the climate (i.e. temperature, rainfall and humidity) in your area during the past ten years? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- v. How do you think this climate change is affecting apple and other crops? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- vi Any other relevant information? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 1B. Information about Agriculture and Household Economy

- i. How much land do you have? \_\_\_\_\_
- ii. Family size: How many members are there in your family? \_\_\_\_\_  
\_\_\_\_\_
- iii. Which crops are you growing?
- a. Food crops \_\_\_\_\_  
\_\_\_\_\_
- b. Cash crops \_\_\_\_\_  
\_\_\_\_\_
- iv How much area have you given to each crop? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 1C. About Apple

- i. How much area have you given to apple? \_\_\_\_\_
- ii. How important is apple for you? \_\_\_\_\_  
\_\_\_\_\_
- iii. Which variety of apple have you planted? \_\_\_\_\_  
\_\_\_\_\_
- iv What is the yield? \_\_\_\_\_
- v. How much apple do you market? \_\_\_\_\_  
\_\_\_\_\_
- a. Where do you sell your apples? (locally or city markets or export, how much in each place, and price per kg)? \_\_\_\_\_  
\_\_\_\_\_

i. Local market?

Quantity sold \_\_\_\_\_

Price per kg \_\_\_\_\_

ii. City Market

Quantity sold \_\_\_\_\_

Price per kg \_\_\_\_\_

iii. Export? Where?

Quantity sold \_\_\_\_\_

Price per kg \_\_\_\_\_

b. Do you keep apples for yourself (in store)? If yes, how much? And how do you store? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

vi. Do you think that apple production is decreasing these days? \_\_\_\_\_  
\_\_\_\_\_

vii. How do you know that apple production is decreasing? \_\_\_\_\_  
\_\_\_\_\_

viii. Which variety of pollinizer have you planted? \_\_\_\_\_  
\_\_\_\_\_

ix. What is the proportion (ratio) of pollinizer variety to the main variety (i.e. how many trees of pollinizer variety and how many trees of main variety)? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

x. Where have you planted the pollinizers?

a) In the orchard among the main variety? \_\_\_\_\_

b) away from the orchard? \_\_\_\_\_

xi. If the pollinizer is planted away from the orchard, how do you transfer pollen from its flowers to the flowers of the main variety? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

xii Why have you planted pollinizers away from the orchard? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

xiii. Do you spray pesticides? \_\_\_\_\_  
\_\_\_\_\_

- xiv. How important do you feel is the use of pesticides on apple and other cash crops?
- a) Which pesticides do you use? \_\_\_\_\_
  - b) How many sprays per season? \_\_\_\_\_
  - c) Which time/stage do you use the pesticides?
    - i) before flowering? \_\_\_\_\_
    - ii) during flowering? \_\_\_\_\_
    - iii) during fruiting? \_\_\_\_\_

xv. Any other relevant information? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 2. Information on Pollination

i. How long ago did you come to know that pollination is very important to produce fruit and improve the quality of apple? \_\_\_\_\_  
\_\_\_\_\_

ii. How did you know this? \_\_\_\_\_  
\_\_\_\_\_

iii. Who told you about this?

a) government officials? \_\_\_\_\_  
\_\_\_\_\_

b) some other person? \_\_\_\_\_  
\_\_\_\_\_

iv. Do you think your apple crop is being adequately pollinated these days naturally by wind, or insects, if not why? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

v. If your crop is not adequately pollinated by wind or natural insects, how do you manage the pollination or do you suffer the loss in yield? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

vi. Any other relevant information? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 3. Information on Natural Insect Pollinators

i. Have you ever seen insects on apple flowers in your orchards? \_\_\_\_\_  
\_\_\_\_\_

- ii. Which types of insects have you seen; honeybees or other insects? \_\_\_\_\_  
\_\_\_\_\_
- iii. Do you think there were enough to pollinate your apples before? \_\_\_\_\_  
\_\_\_\_\_
- iv. Do you find similar insects on your apple flowers these days also? \_\_\_\_\_  
or do you find less insects? \_\_\_\_\_  
or you do not find any insects? \_\_\_\_\_
- v. If you do not find the same insects as before, what do you think happened to them or  
where have they gone now? \_\_\_\_\_  
\_\_\_\_\_
- vi. Do you think the pesticides you use have killed those insects? \_\_\_\_\_  
\_\_\_\_\_
- vii. Or do you think that the apple cultivation has increased these days and the insects did  
not increase, therefore the same number of insects is not found on apple bloom? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- viii. Or do you think that due to the climate change these insects do not appear on apple  
flowers? \_\_\_\_\_  
\_\_\_\_\_
- ix. Have you seen honeybee colonies in the wild in the forests? \_\_\_\_\_  
\_\_\_\_\_
- x. Any other relevant information? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### 4. Information about Honeybees

- i. Do you keep honeybees? \_\_\_\_\_
  - a. Which honeybee, native or European? \_\_\_\_\_
  - b. How many colonies do you have? \_\_\_\_\_
- ii. Are there any commercial beekeepers (local, or migratory coming from other areas)  
keeping their bees in your area during the apple flowering season? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- iii. Any other relevant information? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 5. Manual/Hand Pollination of Apple/Other Cash Crops

- i. Do you do apple pollination manually? \_\_\_\_\_  
\_\_\_\_\_
- ii. How do you do this? \_\_\_\_\_  
\_\_\_\_\_
- iii. Why do you feel it is necessary? \_\_\_\_\_  
\_\_\_\_\_
- iv. How many apple trees do you have? \_\_\_\_\_
- v. Do you pollinate them by yourself (your own family) or do you need help from other people? \_\_\_\_\_  
\_\_\_\_\_
- vi. How much labour (persons) is required for hand pollination of your apple crop? \_\_\_\_\_
- vii. How many trees/flowers can a man/woman/child pollinate in one day? \_\_\_\_\_
- viii. Do you pay money to the labourers or do you help in pollinating their orchards (barter basis)? \_\_\_\_\_
- ix. How much is the increase in the apple production by hand pollination? \_\_\_\_\_
- x. Or do you think that if you do not pollinate your crop by hand, you will not have any apple fruit at all? \_\_\_\_\_
- xi. If you have bees, or if you have commercial/migratory beekeepers during the apple flowering season, then why don't you use honeybees for pollination of your apple crop? \_\_\_\_\_  
\_\_\_\_\_
- xii. Any other relevant information? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 6. History of Manual/Hand Pollination

- i. When did you plant your apple orchard? \_\_\_\_\_
- ii. For how long (how many years) have you been doing hand pollination of your apple flowers? \_\_\_\_\_

- iii. How did you realise that there is a need for hand pollination of your apple crop; what were the indicators? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- iv. Are all the farmers in your area doing hand pollination of their crops? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- v. How much is the apple production in your orchard at present with hand pollination? \_\_\_\_\_  
\_\_\_\_\_
- vi. How much do you think could be the production without hand pollination? \_\_\_\_\_  
\_\_\_\_\_
- vii. Do you think hand pollination also increases the quality of your apple fruit? \_\_\_\_\_  
\_\_\_\_\_
- viii. Any other relevant information? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 7. Miscellaneous Information

- i. If there are beekeepers in your area, why don't you hire their bee colonies for pollination? \_\_\_\_\_  
\_\_\_\_\_
- ii. Or if you want to hire them, why don't the beekeepers rent their bee colonies to provide pollination services? \_\_\_\_\_  
\_\_\_\_\_
- iii. Any other relevant information? \_\_\_\_\_  
\_\_\_\_\_

## 8. Technical Information

- i. How do you think climate change is affecting apple pollination?
- a) do you think there is high humidity making pollen heavy and therefore wind can not transfer pollen from one flower to another? \_\_\_\_\_
  - b) the weather is too wet (rainy) during apple flowering? \_\_\_\_\_
  - c) or the weather is still, there is no wind at all to help pollen go from one flower to another? \_\_\_\_\_
- ii Any other, please specify? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 9. Institutional Support

i. Are you getting some kind of support from government research institutions? \_\_\_\_\_  
\_\_\_\_\_

ii. What kind of support are you getting?

a) awareness? \_\_\_\_\_

b) training? \_\_\_\_\_

c) financial support? \_\_\_\_\_

iii. How many times did government officials visit you? \_\_\_\_\_

iv. What kind of support do you want to get from government institutions? \_\_\_\_\_

a) awareness? \_\_\_\_\_

b) training? \_\_\_\_\_

c) financial? \_\_\_\_\_

iv Any other, please specify? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10. Do you have pollination problems in other crops? \_\_\_\_\_ (yes / no)

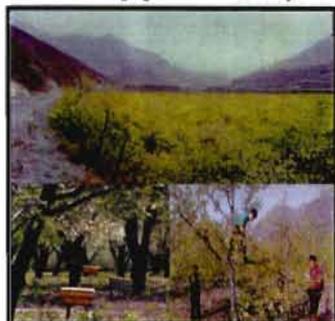
If yes, in which crops? \_\_\_\_\_  
\_\_\_\_\_

If yes do you recommend that ICIMOD do similar studies for other crops? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

See also ...

# Warning Signals from the Apple Valleys

## WARNING SIGNALS FROM THE APPLE VALLEYS



A film by Uma Partap



INTERNATIONAL CENTRE FOR INTEGRATED MOUNTAIN DEVELOPMENT  
Kathmandu, Nepal



AUSTROPROJEKT GMBH, AGENCY FOR TECHNICAL COOPERATION  
Vienna, Austria

A film by Uma Partap  
October 2001

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This video, shot in apple valleys in Himachal Pradesh (India), the Northern Areas and Balochistan Province of Pakistan, and Maoxian county of China, highlights the pollination problems faced by apple farmers (and farmers of other crops) in the Hindu Kush-Himalayan region. The importance of apples in the economy of mountain areas is shown, together with the problem of declining apple productivity due to inadequate pollination. Excellent shots illustrate the major causes: insufficient pollinizers (trees), lack of pollinating insects, and bad weather conditions (climate change). The film shows how some farmers manage apple pollination — large-scale use of pollinizer bouquets to increase the proportion of pollinizers and use of honeybees as pollinating insects in Himachal Pradesh, India; and hand pollination in Maoxian county China.

# about the authors

## **Uma Partap**

Uma Partap is a Research Officer for pollination in the ICIMOD Beekeeping Project. She has a Ph.D. in Biological Sciences from Himachal Pradesh University, Shimla, India and eighteen years of research experience that covers diversified fields including drought eco-physiology and pollination ecology. At ICIMOD, Dr. Partap has been instrumental in establishing the crop pollination programme under the Mountain Farming Systems Division. At present, she is studying pollination issues in mountain crops and focusing on raising awareness among agricultural planners, policy-makers, researchers, and farmers in the Hindu Kush-Himalayan region about the importance of managing crop pollination and the use of bees for this purpose. She has published various books and manuals in English and regional languages (Hindi, Nepali, and Urdu) and about forty research papers on such topics as bee pollination, bee flora, honeybee behaviour and drought eco-physiology, as well as produced a video film highlighting apple pollination issues in the HKH region.

## **Tej Partap**

Tej Partap is Vice Chancellor of the CKS Himachal Pradesh Agricultural University, Palampur, India. He has a Ph.D in Agroecology from Himachal Pradesh University, Shimla, India and twenty-five years of experience in the field of mountain agriculture. He headed the Mountain Farming Systems Division of ICIMOD from July 1994 to December 2000. Dr. Partap is a Honorary Professor of Mountain Agriculture at the Tibet Academy of Agriculture and Animal Sciences, Lhasa, where he has been an advisor on research, planning and human resources development for highland agriculture since 1995, and an Honorary Professor in Mountain Agriculture at the Institute of Geographical Sciences and Natural Resources, Chinese Academy of Sciences, Beijing. Dr. Partap is an active promoter of cooperation and exchange of knowledge and information between the mountain regions of the world, and is currently Vice Chairman of the Himal-Andes Initiative. In 2000 he was elected representative of Asia Pacific Mountain Network on the Board of Directors of the Mountain Forum. Dr. Partap has authored/edited twelve books and over fifty research papers in peer reviewed journals, and produced five video films.

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