Collection and marketing of high value pharmaceutically and therapeutically important plants from the Swat District, Pakistan

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In 2012, existing practices in trading high value minor crops (such as medicinal and aromatic plants) from the Swat district, Pakistan, were analyzed. The goals of the study were to: (1) examine the current status of the high value medicinal plant trade in Pakistan and (2) investigate the linkages in the market chain from collectors in the Swat district to final consumers. Within the Swat District, the focus was on the collection pattern of medicinal plants as an economic activity and its likely destinations in national or international markets. Herbal markets in major cities of Pakistan were surveyed for current market trends, source of material, import and export of herbal material, price patterns and market requirements. Collectors are mostly women and children of Middle Hill tribes and whose earnings are generally done for supplementary income through this activity. Pakistan exports of high value plants generate over US $10.5 million annually, with over 70% of the supply coming from Swat District. However, the market share of the high value plants from the Swat District due to the unreliable and often poor quality of the material supplied the length of the supply chain and poor marketing strategies. These problems could be addressed by improving the knowledge of those at the start of the supply chain, improving linkages among all steps in the chain and developing sustainable harvesting practices.

Key words: Trade pattern, medicinal plants, import, export, economic growth.

INTRODUCTION

The phrase "High value minor crops" refers to plants that contribute relatively little to a country’s agricultural output. They fall into two major groups: (1) herbs and spices and (2) medicinal and aromatic plants. Although individually small contributors to output, the global importance of medicinal and aromatic plants (MAPs) in total is evident

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from the fact that in 2006, global trade of MAPs reached $60 billion (Adhikari, 2001; Hamilton and Hamilton, 2006). Europe alone annually imports about US $1 billion in MAPs from Africa and Asia (Ghimire et al., 2004; Sher and Hussain, 2009). Such trade is expected to expand substantially by the year 2050 (Lang, 2008) because of the increasing popularity of herbal medicines and expanding use of herbs for flavoring a wide diversity of foods (Al-Quran, 2008; Khan et al., 2011).

MAPs have been cultivated or collected for centuries in many parts of Pakistan, including the Swat District. About 50 to 60% of the rural households in the Swat District collect MAPs (Sher and Hussain, 2009). In all cases, such activities constitute only a small part of the household’s farming operation. However, because much of the farming in the mountains of the Swat District is near subsistence levels, collection of MAPs could become a more important source of supplementary income for these rural farmers (Sher and Hussain, 2009; Khan et al., 2011). Although the plants collected have a high value in the market place, the collectors usually have no knowledge of marketing (Shinwari and Qaiser, 2011). This study is a first step in examining a means of increasing the value and expanding the benefit of MAPs production for people in the Swat District. A consequent aim is to examine various steps in the supply chain, from collector/ cultivator to final domestic market or exporter, suggesting possible ways in which the market value of both raw and processed MAPs could be improved.

Value-added activities currently carried out by the collectors and dealers in the area include product cleaning, drying, cutting and in some cases, washing of the plants or plant parts to be sold. However, these activities are usually conducted only to the extent needed to meet the minimum quality standard required by the local market (Anonymous, 2000) and without regard to modern management techniques. This suggests that collectors would benefit from training in how to better meet market needs, as well as means of adding value to their products which could impact demand and sale value.

There exist other opportunities to improve collector profit margins as well. This includes improving the collectors’ skills and abilities to produce marketable surpluses, introduction of modern management practices, improved market linkages (including the implementation of secure trade contracts) and the ability to store product (for example, a species collected in the present day may bring about a higher price six months later). In this way, collectors may begin to market products more effectively, which could transfer a portion of the margin from middlemen to collectors. Final MAP markets are split primarily into three segments: Domestic industrial, export and local hakims (traditional healers). Collectors do not typically have linkages with these markets and therefore must rely on local traders to sell their products within the existing value chain. Collectors are therefore, often isolated from the final consumers of MAP products and do not always have a good understanding of market needs beyond the traders themselves. To enhance incomes from MAPs, collectors need a better understanding of the needs of individual markets. This is critically important and especially regarding quality specifications and their impact on post-harvest management and proper product handling.

The study for District Swat was therefore, initiated to identify constraints such as a fragmented information base, training and educational deficiencies, an uncoordinated approach to collection and marketing of MAP species and the need to clearly identify traders and markets. This paper concentrates on describing the levels of collections and marketing channels and prices at each level for the MAPs originating in Swat. It provides baseline analysis for a larger study sponsored by US Agency for International Development’s Bureau - the International Food Policy Research Institute (USAID-IFPRI) under the Pakistan Strategic Support Program which is implemented in conjunction with the Planning Commission of Pakistan. This specific study was launched in Swat District to respond to the aforementioned challenges and to support a new framework for economic growth of the country.

METHODOLOGY

A market study of trade patterns for high value MAP species was conducted during summer 2012 in many parts of Pakistan with the particular reference to plants from the Swat District. The areas surveyed can be broadly classified as source and markets. In studying the Swat District as a source, we examined the collection pattern for MAPs as an economic activity, as well as likely MAPs destinations in National or International markets. Information on various aspects of collection, such as collection method, time and marketing of each species were gathered from local collectors and farmers through interviews and discussions. A total of 120 collectors and farmers were interviewed for this survey. In the study of markets, a survey was conducted on how and from whom plant material was obtained and when it was sold. Herbal markets in major cities of Pakistan (Karachi, Lahore and Peshawar) were surveyed to determine current market trends, sources of material, state of the import and export market for herbal material, price patterns and market requirements. Hakims (practitioners of Eastern medicine) as well as representatives of large herbal manufacturing industries were also interviewed in these areas for their raw material preferences and quality requirements. Respondents were asked about their annual income earned from the sale of targeted species and returns to the work invested. Interviews were conducted with a total of 120 collectors and farmers participants in the marketing chains.

RESULTS

Between them, the 120 collectors surveyed harvested 80 MAP species for commercial use. Most of the harvesting activity took place in the summer but three of the 80 species
(Morchella esculenta, Viola serpense and Colchicum luteum) were gathered from March to May. Most of the species were sold to wholesalers via middlemen. Of the 80 species, 24 were high value MAPs that are exported to both National and International markets (Table 1). There were 80 medicinal species collected, 24 of which (Table 1) had a high market value and were collected in large amounts for sale.

Marketing of MAPs in District Swat was conducted by some collectors and a few local shopkeepers. There were several regular collectors among the residents. They supplied domestic trading centers such as local bazaars and bazaars in Mingora, Peshawar, Islamabad, Lahore and Karachi, as well as some foreign trading centers.

Collection and trade of MAPs was highly uncoordinated. To obtain plant materials from District Swat, dealers from national markets send representatives to local dealers in Mingora and placed their orders. The local dealers then passed the orders on to their agents, i.e. local shopkeepers. In turn, these agents pass the orders to smaller shopkeepers and collectors. In some instances a local agent may employ a daily wage laborer to collect plants for Pakistan Rupees (Rs) 200 to 300 per day (approximately US $2 to 3), but this was unusual. The collectors are generally illiterate and usually do not negotiate a sales price when selling their plant materials to an agent. Agents sell the plant material to dealers in Mingora who then pass it up the supply chain which may include up to seven steps (Badakhshan to Karachi) in total.

Market channels

Figure 1 displays the marketing channels identified in the interviews of MAP market participants. It was noted that the recordings of the present study in Swat District show that Mingora is the main trade center for many high value plants. Mingora supplies considerable quantities of plants to various national trading centers of Pakistan including Peshawar, Islamabad, Lahore and Karachi and also abroad. Figure 1 shows the direct linkages in the market channels between the various herbal markets in Swat District and the national and international levels. Mingora receives material from various hilly areas, while the Lahore herbal market acts as the major center of trade in the country receiving imported material from abroad and from the countries sources.

In district Swat, the trade and collection of high value plants is highly uncoordinated and vary that is, from area to area and species to species. For obtaining plants from Swat, dealers from the national market send representatives to local dealers in Mingora to put up their demand. The local dealers pass the message to their agents that is, the local shopkeepers of the valley. These agents inform small shopkeepers and collectors. The collectors gather the species for the local shopkeepers and agents. The collectors are illiterate and do not negotiate for the price of the plant materials that is, they gather sizeable quantities but do not receive reasonable returns. The dealers of Mingora in turn receive the material from the agents and in this way, the plant material gathered pass through three or four sections of the supply chain (Figure 1).

As shown in Table 1, at each step up the marketing chain, the purchase price increases. The greatest increase in both the national and international price (numbers are how many times higher the national and international price, respectively was a multiple of the purchase price from collectors in District Swat) was for Aconitum heterophyllum (10, 15), Asparagus adscendens (6.4, 10), Adiantum capillus-veneris (5, 12.5) and Acorus calamus (4.5, 10). As shown by the two sets of data for Viola serpense, the value of the plant material is determined by the plant parts constituting the sample sold that is, flowers of V. serpense sell for 500 Rs/kg, where a mixture of leaves and flowers has a retail price of only 200 Rs/kg. For these products, the international price is 3 to 4 times higher than the price received by collectors. The price of each species varies from year to year, at least partly due to changes in demand and supply. The MAPs that were the highest price were Morchella esculenta (10,000 Rs/kg), V. serpense (flowers only, 500 Rs/kg), Bunium persicum (400 Rs/kg) but the MAPs that were the best income source for the collectors because of their combination of price and quantity were Morchella esculenta, Diospyros lotus, Plantago major and V. serpense (flowers only or flowers and leaves). The price for Bunium persicum was high but the amount sold was low.

It was generally observed in the interviews with local collectors, farmers and dealers that in the surveyed valley, the local agent (middleman) received handsome returns. The local shopkeepers or other persons acting as agents of the traders of the regional herbal markets are the major buyers from the local collectors. It is also observed that the local wholesalers control price information to the collectors which has enabled them to maintain high profits. The price differentials for other species can similarly be traced in Table 1. The export of crude herbal items of the MAP species to different countries is largely through individual and local exporters in JoddiaBazzar, Karachi and AkbariMandi, Lahore. The species concerned were being exported to Germany, Japan, France, Switzerland, Middle East, India and South Africa.

Extent of activity and income of collectors in Swat

The MAPs that sold best in 2011 to 2012 were D. lotus (90t), B. amplexicaule (12t), P. major (8t) and V. serpense (flowers and leaves mixed; 7t). The interviews with local
farmers suggested a larger amount of these species could have been sold. The amount collectors in district Swat earned from MAPs in 2011 to 2012 was about Rs 0.7 million. The money generated by selling these MAPs outside the district was about Rs 20 million. The amount of MAPs collected per household was 12 to 150 kg. Collection of MAPs was considered an important activity by about 315 households that is, 78.75% of the households surveyed. Such households collected an average of over 100 kg per year. Assuming that in total 35 days were involved in the harvesting, collection and portage of MAPs and that about 1.7 persons were involved per household, the total employment generated by the activity comes to about 15,500 person days per year. The present endeavor also estimated that the total beneficiaries and the income distribution from the MAPs trade in the study area were about 405 households. In terms of per household benefits, the village trader appeared as the largest beneficiary. However, trading was a full time activity for much of the year. Also the agent (middlemen) received a higher proportion of the income after marketing the produce directly.

Incremental value and price fluctuations of MAPs in the trade chain

The price of the high value MAPs increases at each step in the supply chain (Table 1). Partly, this increase is because of the incremental transportation and labour costs and partly because at each step which some profit must be generated to support the individuals involved. Another factor contributing to the price increase is that some plant material is lost at each stage of the trade chain. Some plant material is lost at each stage. Some plant material is lost at each stage.

### Table 1. High value plants of district Swat origin with their incremental values at different stages of the trade chain.

<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Part Sold</th>
<th>Qty. (Mound)</th>
<th>Price/Kg</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Purchase</td>
<td>Retail</td>
</tr>
<tr>
<td>Geranium wallichianum</td>
<td>Rh.</td>
<td>2000</td>
<td>190</td>
<td>250</td>
</tr>
<tr>
<td>Aconitum heterophyllum</td>
<td>Rh.</td>
<td>1000</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Acoruscalamus</td>
<td>Rh.</td>
<td>5000</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Adiantumcapillus-veneris</td>
<td>W.P.</td>
<td>4000</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Trachyspermumammi</td>
<td>Fr.</td>
<td>5000</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>Asparagus adscendens</td>
<td>Rh.</td>
<td>2000</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Berberis vulgaris</td>
<td>B.</td>
<td>4000</td>
<td>200</td>
<td>250</td>
</tr>
<tr>
<td>Bergenia ciliate</td>
<td>Rh.</td>
<td>3000</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>Colchicum luteum</td>
<td>C.</td>
<td>3000</td>
<td>100</td>
<td>190</td>
</tr>
<tr>
<td>Plantago major</td>
<td>Fr.</td>
<td>8000</td>
<td>350</td>
<td>400</td>
</tr>
<tr>
<td>Dioscoreadeltoida</td>
<td>Rh.</td>
<td>3000</td>
<td>100</td>
<td>220</td>
</tr>
<tr>
<td>Diospyrus lotus</td>
<td>Fr.</td>
<td>90,000</td>
<td>50</td>
<td>90</td>
</tr>
<tr>
<td>Geranium wallichianum</td>
<td>Rh.</td>
<td>2000</td>
<td>50</td>
<td>70</td>
</tr>
<tr>
<td>Morchella esculenta</td>
<td>W.P.</td>
<td>5000</td>
<td>10,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Paeonia emodi</td>
<td>Rh.</td>
<td>5000</td>
<td>50</td>
<td>70</td>
</tr>
<tr>
<td>Bistorta amplexicaule</td>
<td>Rh.</td>
<td>12,000</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>Pistacia integrimnea</td>
<td>Pod.</td>
<td>1000</td>
<td>200</td>
<td>350</td>
</tr>
<tr>
<td>Podophyllumhexandrum</td>
<td>Rh.</td>
<td>2000</td>
<td>70</td>
<td>150</td>
</tr>
<tr>
<td>Polygonatummultiflorum</td>
<td>Rh.</td>
<td>5000</td>
<td>50</td>
<td>80</td>
</tr>
<tr>
<td>Buniumpersicum</td>
<td>Fr.</td>
<td>1000</td>
<td>400</td>
<td>430</td>
</tr>
<tr>
<td>Valerianawallichii</td>
<td>Rh.</td>
<td>2.500</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>Viola serpens</td>
<td>Fl.</td>
<td>4000</td>
<td>500</td>
<td>550</td>
</tr>
<tr>
<td>Viola serpens</td>
<td>L+Fl.</td>
<td>7000</td>
<td>200</td>
<td>250</td>
</tr>
<tr>
<td>Commiphoramukul</td>
<td>Fl.</td>
<td>5,000</td>
<td>100</td>
<td>150</td>
</tr>
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</table>
estimate that 90% of the collected MAPs material was being sold without any value added care being given to them. Another problem identified in the market chain interviews, one that will probably become more severe in future, is that many of the MAPs currently being collected in District Swat are now being produced and exported from other countries, including India and China. In 2011 to 2012, plant material from these areas was competitive in price and often of better quality. The difference in quality resulted in buyers showing less interest in plant

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**Figure 1.** Supply routes from collection sites and other areas to local, national and international markets.
material from Swat and/or offering lower prices for it.

DISCUSSION

The geographical location of District Swat provides an ideal physical environment for the growth and nourishment of many high value medicinal and aromatic plants. These crops can make a contribution to economic development of the area, in particular, and the country in general. The study on the trade pattern of MAPs in District Swat revealed that various MAPs are sold in large quantities both in national and international markets, indicating their importance as a source of income for the inhabitants of the mountain communities. The study generally observed that District Swat is the collection and trading center for many high value minor crops including MAPs, having a well-established market which supplies various trading centers in Pakistan and abroad. Rashid et al. (2011) also reported that the majority of marketable medicinal plants are collected from Northern areas of Pakistan including District Swat.

The MAPs trade in Pakistan, including District Swat, operates with minimal state intervention and documentation. This is also true for many European and Asian countries. Because of this poor documentation (Hamilton and Hamilton, 2006), decision makers are usually unaware of the significance of the trade in MAPs and of the negative impacts that unsustainable harvesting of these plants may have on the environment and on people’s welfare. A vibrant private market is a desirable outcome as long as none of the participants is able to exploit those at a lower level in the marketing chain and as long as the natural environment is not deteriorated by the over-harvesting of the collectors. These concerns can justify educational efforts, collective marketing activities by collectors and regulations of harvesting as government policies.

Pakistan as a whole exports medicinal plants worth over US $10.5 million (Shinwari and Gilani, 2003). The herbal markets of Karachi (Jodia Bazar) and Lahore (Akbari Mandi) are the primary centers for this export trade. The destination of the exports includes many parts of the world, including Europe, North America and the Middle East. The Swat District’s share of this market is about 70% (Shinwari, 2010). Generally, plants which are either indigenous to Pakistan or found in abundant quantities are exported abroad. Pakistan not only exports MAPs but also imports over US $130 million annual of herbal material from other countries, primarily from India, Thailand, China, Indonesia, Tanzania, Iran, and Afghanistan (FAO, 1995; Anonymous, 1999). The herbal market of Lahore (AkbariMandi) is a primary hub for this trade, receiving large quantities of imported herbs from India and recently, from China. The increasing import market is largely attributed to a combination of increasing market demand and the inferior quality of indigenous plant material. Collection of plant material in Swat District appears to be on a “first-come-first-served” basis. There is no management structure involved. This is a cause for concern because as Saganuwan (2010) reported, the lack of any check, even on the collection of rare or threatened species, endangers this important source of income. Similarly, Larsen and Smith (2004) who examined stakeholder perspectives on commercial medicinal plant collection in Nepal noticed that most of the commercially important MAPs are becoming rare and sparse, due to the combination of unregulated collection and overgrazing.

In the interviews, very few of the collectors knew about the existence of a major market for MAPs. Olsen and Larsen (2003) also found that the trade and collection of plant materials is mostly handled by unskilled persons. As a result, valuable medicinal plants are lose value on their way to their final market while over-extraction, destructive harvesting techniques and habitat loss are severe threats to the long term viability of this important source of income (Mardis, 2008). This suggests that there is a dire need to develop practical and economically sound strategies for the efficient utilization of Pakistan’s natural resources such as the MAPs in order to improve the condition of marginalized communities, a process that should eventually lead the country towards economic stability and peace.

The livelihood of many people in district Swat is based in part on the collection and trade of MAPs. Collection from the wild is so far the only source of MAPs in the region. Many of the MAPs collected in Swat find their way to the herbal markets of large cities and from there to the international markets. There is need for a program that focuses on assisting collectors and local dealers in providing consistently high quality, well preserved material to purchasers, combined with a sharing of information as to why this is important. This program should also address the issue of sustainable harvesting and the possibility of cultivating MAPs that are currently collected from the wild. This paper provides a baseline analysis of the marketing channels and price differences that underscore these needs. There are, as is to be expected, price increases as the product moves through the supply chain but these are exacerbated by the lack of knowledge among collectors and local dealers concerning the demand of the plants they are asked to collect. MAPs markets split primarily into three segments: Domestic industrial, export and local hakims (traditional healers). Collectors usually have no direct knowledge of the markets for their products and therefore, must rely on local traders to sell their products within the existing value chain. To enhance their income from MAPs, collectors and local dealers need a better understanding of the markets they are supplying. This means understanding quality expectations and their impact on post-harvest
management and handling as well as the extent and seasonality of the demand. There exist other opportunities to increase the value of MAPs trade for collectors and local dealers. These include improving the collectors’ skills and abilities to produce marketable surpluses, improved market linkages (including the implementation of secure trade contracts) and developing the ability to store product until it can obtain a higher price. In this way, collectors may begin to market products more effectively which could transfer a portion of the margin from middlemen to collectors. Household incomes can also be enhanced if communities acquire a better understanding of the economic importance of high-demand natural plant resources, the interests and respective roles of the key stakeholders involved (including pharmaceutical and exporter buyers). This must include understanding of the importance of sustainable collection and cultivation practices to the long term livelihood of the community. Moreover, the household incomes can be enhanced if communities acquire a better understanding of the economic importance of this high-demand natural plant resources, the interests and respective roles of the key stakeholders involved (including pharmaceutical and exporter buyers). The purpose of this study was to examine the current status of the high value medicinal plant trade in Pakistan and investigate the linkages in the market chain from collectors in District Swat to final consumers. During the course of the study, a range of possible interventions were identified, such as training of collectors/farmers, improving marketing linkages and improving understanding of the needs of the national and international markets, which would enable MAPs to become the prime ‘engines of growth’ for the local economy. Indeed, simply conducting the study helped inform local collectors/farmers about the value-added products derived from MAPs. It is reasonable to expect that improving market linkages between producers and buyers will result in increased economic benefit for local collectors, farmers and dealers, enabling their communities to become hubs of significant economic activities with a multi-dimensional impact on the economic development of district Swat. Such developments are also essential if Pakistan is to maintain or improve its position as an international supplier of MAPs.

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