“Medicinal crops” in Ethiopia
- Current status and future potentials-

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Preface

In response to the Development Initiative which was proposed by the then Prime Minister Koizumi on the occasion of the WTO ministerial conference in Hong Kong in December 2005, the Ministry of Agriculture, Forestry and Fisheries has announced “the Initiative by Ministry of Agriculture, Forestry and Fisheries”. This initiative makes it its mainstay to support the production of marketable products of agriculture, forestry and fisheries, and, for that purpose, aims at assisting developing countries in their efforts of developing not only the production but also the sub-sectors of processing, distribution and marketing.

For the fiscal year 2007, in order to contribute to this development initiative, we took up the medicinal plants in Ethiopia as the subject of our activities, and the results of which are summarized in this document. Incidentally, we would like to mention in advance that the subject matter of our study, “medicinal crops”, are treated as “medicinal plants”, in view of the current status of their production and utilization in the country, and that they include not only those which are distributed as pharmaceutical products but also other commodities for food locally believed to be beneficial to health as well as those of herbs and spices.

This document has summarized systematically the current status of affairs of medicinal plants, and, at the same time, tried to present concrete ideas as much as possible, so that they will serve as a clue in actual planning for developmental cooperation in the country in the future. We would be greatly privileged if the information in the book shall be put to practical use by those concerned.

As a final remark, I would like to remind you that this has been prepared solely on the responsibility of our association, and hence, does not represent the view of the Ministry of Agriculture, Forestry and Fisheries, or the Ministry of Foreign Affairs.

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Table of Contents

Introduction: Medicinal plants in Ethiopia – the potential and possibility for development

Masayoshi Shigeta

Medicinal plants still play important roles in daily life in developing countries of Asia and Africa, including Ethiopia. Medicinal plants not only serve as complements or substitutes for modern medical treatments, which are often inadequately available, but also enhance the health and security of local people. Thus these plants play indispensable roles in daily life and are deeply connected to diverse social, cultural, and economic events associated with life, aging, illness, and death.

In recent years, there have been rising expectations that certain medicinal plants might become cash crops, with large added value and large revenues for local people. For such expectations to become a reality, we must first have basic information on medicinal plants in local communities. With this in mind, I review the use and place of medicinal plants in local communities and considerations for cash crop development.

Here, medicinal plants are broadly propositioned as a high-profit crop of the future, but how should we interpret “high profit”? The term implies a crop that brings in a great deal of money; however, should money be the only criterion? Even if much money can be earned, larger and more relevant questions are by whom is it earned, when, where, how and how much, from whom, and by what means?

In other words, we must consider the significance within a cultural context and that culture’s notions of “value” and “profitable.” The question of what is “profitable” often becomes a point of argument in discussions of the development and progress of African agriculture. That is, how can we interpret the reality that African farmers who have tried to adapt to the market economy system by accepting a path to modernized agriculture represented by chemical fertilizers, agricultural machinery, and improved varieties have, nonetheless, not necessarily escaped from economic poverty? Having searched for the answer to this key question, I propose that African farmers who appear to have joined the market economy might, in fact, not necessarily have been integrated substantially into the fabric of its fundamental principles. This view is not unique. Many researchers of the traditional economies of Africa have expounded their versions of this argument from various perspectives. Space is too limited here to detail all those perspectives. Instead, I cite a researcher who shares my argument and viewpoint, namely, one of our committee members, Mr. Ryoichi Udagawa, who advocates “Community Trade rather than Fair Trade.” We essentially share the same approach to the

question of what is “profitable” by thinking primarily in terms of the standards of African farmers and considering that notions of what is profitable or fair may represent imposed external standards.

Considering this perspective, can we still envisage a model that ensures the success of medicinal plants as cash crops in Ethiopia? There is no specific successful model that should be emulated as the template for medicinal plant production. However, the cases of other crops indigenous to Ethiopia, namely coffee, *khat*, and *ensete*, may serve as reference examples.

These crops are found in homegardens throughout the Ethiopian highlands. In terms of agro-ecological significance, they are comparable to cultivated medicinal plants. Further, like medicinal plants, these crops have long held important places in the livelihood of local people.

First, starting with coffee, we can learn from its position as a “cultural asset.” No other Ethiopian crop has been so well branded that it is immediately evoked by the simple mention of Ethiopia. Ideas to bring about even further added value are ongoing, such as the creation of new brands out of local varieties. These strategies could also be adopted for medicinal plants.

Next, *khat* is a nonessential grocery item that has well-established systems of production, consumption, and distribution, although there is some criticism of its stimulant property. Since most medicinal plants are traded as “fresh commodities,” we can learn from the technologies associated with *khat* distribution, such as the delicate packaging technique that enables transport of the green *khat* leaves.

Finally, *ensete*, which, along with *tef*, is one of the basic subsistence crops in Ethiopia, has storable properties and possibilities for multipurpose usage that might provide lessons for medicinal crops. *Ensete* is a perennial crop that is grown abundantly in homegardens but is generally not exploited as a cash crop. Recent studies have suggested that such a seemingly irrational situation of crop management has significance in the issue of food security in rural areas of Ethiopia. Furthermore, the concept of multipurpose usage of a single crop plant represents beneficial use of land and space.

All three crops have a common background in that local systems of distribution and marketing exist for each, and each has a long history as a cash crop. However, an important negative aspect to consider in regard to these crops is that there has been relatively little interest in improving their cultivation, production, and processing technologies, even though great production capacity already exists and their marketing has greatly benefited the stakeholders involved.

It is plausible that certain elements of existing crop systems can serve as examples of successful models of highly profitable crops. However, many problems must be accounted for before this concept can materialize into a success story of profitable cash crops that will help the

Ethiopian people realize “better” lives.

I will finish these introductory remarks by pointing out some of these problems, which fall into the following five themes: value and economy; consideration of universality; respect for accumulated knowledge; ensuring innovation; and collaboration.

First, as I have already noted, I have reservations about the idea that “being profitable is all that counts.” We must consider to the concept of value held by the particular society concerned. Let us assume that there is such a concept of value shared by society members. Even if this were the case, the idea of “value” may not be fixed and remain forever unchanged. It is also clear that economic effects are not only concerned with matters of money. In our case, we might connect economic effects with enhancements of health, welfare, happiness, and security. In this regard, it is necessary to also promote collaboration while comparing and considering different definitions of value.

Second, there is the issue of universality. When we consider the growth of a local community through the development of medicinal plants, this matter goes beyond that particular plant. Unless we deeply understand all aspects of the issue, including the sustainability of development, ecology, society, and the culture of the community, it would be improper to propose any cooperative development program.

In this regard, the third problem I would like to point out is that of honor and respect for accumulated local knowledge. It is essential that we start our projects based on the results of past studies by indigenous Ethiopian scholars and that we develop projects with full respect and incorporation of such wisdom. That is, we must consider the conventional knowledge accumulated by people in regard to medicinal plants as beneficial plant resources. This approach is the leading principle that should be adhered to when forming joint research efforts to develop traditional medicinal plants as cash crops.

Another often-neglected issue is the need to ensure the spirit of innovation through scientific approaches to the study of medicinal plants. We must have more exact knowledge of the physical properties and effects of medicinal plants, beyond the sometimes vague characteristics described in traditional and cultural contexts. Leading-edge technology and techniques can be used to investigate “traditional” methods of use and will be indispensable in undertaking research programs in collaboration with Ethiopian scientists.

Last, I must stress the importance of collaboration, which has been brought up repeatedly in this talk. The possibility of “profitable” medicinal plants will emerge only when long-term collaboration is envisaged not only by plant researchers but also by the Ethiopian people who use these plants on a daily basis.

(The end)

Chapter 1 Utilization and production of medicinal plants

1. Natural medicines

It is believed that about half of the top 25 best selling medicines in the world originate from natural materials, including plant substances. Although the number of cases where a natural material as it is makes a medicine is not so many, quite a few of them have served as a model (lead) compound which has subsequently been modified in its structure and processed into an excellent medicine.

Incidentally, it may have been common knowledge that the principal objects of plant as resources of medicine, since ancient times, have been looked for among those growing in the tropics. One of the reasons for it could have been attributed to the diversity, the particularity or the novelty of plant species growing there. The more numerous are the plant species, the more numerous would be the chemical species, and sometimes there is a possibility that the search would end up with finding an ingredient with undreamt-of chemical structure. Even nowadays, a succession of findings is being made about compounds that are expected to make excellent medicines in future.

2. Medicinal crops grown in the tropics

Now, if we consider about “medicinal crops”, naturally we may have to add a viewpoint of agriculture (cultivation). In the cases of conventionally well known medicinal crops, because all of them produce raw materials and ingredients that have practical values as pharmacologically active substances, many of them have become the objects of efforts for transplanting to new areas with more favorable environment, and have eventually been put to large-scale cultivation. Moreover, with a view to acquiring and developing varieties of higher quality, intensive efforts have been made for exploring new related species or improvement of varieties.

In recent years, the recognition of importance of prevention of diseases along with their cure is increasing. In particular, their prevention through daily meals has gathered great expectations, and consequently, the study on the category of foods called functional foods which are effective for preventing diseases, the clarification of their chemical factors and their application have greatly advanced.

If we base our observations on such a perspective, presently we may be able to classify into the category of medicinal crops such conventional foods for beverage as tea, coffee and cacao, or such oil crops as oil palm and olive, or furthermore various spices and herbs.

3. What we can expect from medicinal crops in Ethiopia

Now, beginning from this section, reporter wishes to describe what we can expect from Ethiopia, from the viewpoint of medicinal crops, by referring to a few cases to be treated later in this report.

In the domain of food with health-promoting benefits, the antioxidant compound in food constitutes one of the most important targets. This is because the suppression of oxidation of living body as much as possible can prevent (retard development) of many adult diseases.

Lately, it has been found that coffee contains a large amount of antioxidant compounds, such as caffeic acid and its related compound, chlorogenic acid (these compounds are generally referred to as polyphenols in chemical classification). It is attracting attention also as a resource crop for producing antioxidant food factors, being expected to contribute to the prevention of many adult diseases.

Another characteristic of coffee in its contained compounds is the existence of mannan oligosaccharide which is specifically present in coffee. The mannan oligosaccharide is known to be hard to digest and reach to the intestines without undergoing decomposition. The oligosaccharide that has reached the intestines provides nutrients to bacteria living there, and these bacteria often afford beneficial effects on humans. The food compounds that have similar characteristics are called prebiotics and have been reported to provide the effect to regulate the functions of the intestines or to reduce the body fat.

As described above, presently coffee (beans) is becoming a large target in the domain of foods with health-promoting benefits. From now on, there may emerge a new demand for producing not only the coffee beans for beverage purposes but also the particular type of coffee beans that would contain a larger amount of each of components with health-promoting benefits.

It has been known that the products of secondary metabolism of plants vary greatly in quality and quantity depending on the growing environment. The quality and quantity of components with health-promoting benefits in coffee must also be influenced by cultural environment and techniques. It is expected that the topographic and climatic diversity in Ethiopia is hiding the potentials of producing the coffee beans of particular kinds of health-promoting benefits.

If the range of medicinal plants is further extended, frankincense presents also an interesting target. Frankincense (gum olibanum) produced in Arabian Peninsula and on highlands in a part of Africa has been highly valued since antiquity as a natural material for its particular and attractive fragrance that has made it be used on ceremonial occasions. Recently the science on aromas has been evolving, and with the start of practice where “aromas” are

applied also in the clinical domain as in the case of aroma therapy, they are presenting a prospect of significant development in the future as well. Considering the diversity of environmental characteristics in Ethiopia, there would be a potential of producing a particular variety of frankincense.

Each of the above-cited two representative cases may indicate promises of development of “an Ethiopian specialty” based on the growing environment of crops.

Chapter 2 Status of utilization of medicinal plants in Ethiopia

Many medicines widely in use today incorporate ingredients from plants. Traditional "medicinal plants" have greatly contributed to the development of modern medicines. In many developing countries such as Ethiopia, traditional medicinal plants are still commonly used in daily life and play important roles as complements to underdeveloped modern health care services.

For persons involved in collecting and selling traditional medicinal plants, as well as in providing traditional medical services, these plants are often the most profitable commodity available. Hence, great potential exists for medicinal plants to contribute to economic development and poverty alleviation in Ethiopia. Moreover, appropriate management of these plant resources could contribute to efforts to conserve biodiversity and protect the environment.

Similar to the situation in many developing countries, including those in sub-Saharan Africa, 70% of human and 90% of livestock populations in Ethiopia depend on traditional medicines derived from medicinal plants for their primary health care. Typical medicinal plants of Ethiopia include *Hagenia abyssinica*, used as an anthelminthic against tapeworms; *Phytolacca dodecondra*, taken to control the intermediate host of schistosomes; and species of the genus *Maytenus*, many of which contain anti-malarial properties and are objects of research by the U.S. National Cancer Institute. Traditional health care practices and medicines are deeply embedded in culture and have been passed down through oral traditions as well as in written records and pharmacopoeias.

Thus in Ethiopia, medicinal plants and knowledge of their use are culturally deep-rooted and contribute greatly to the health care of humans and livestock throughout the country. However, while various studies have noted the significant role of medicinal plants in primary health care, most previous studies on medicinal plants in Ethiopia have been descriptive efforts aimed a cataloging or preparing checklists of plants and uses. Only a few studies have integrated modern research techniques for analysis and definition of the principal components of Ethiopia's medicinal plants.

Demand for herbal remedies has increased in both industrialized and developing countries. In part, such demand reflects dissatisfaction with conventional medicines in industrialized countries and a lack of doctors and the shortages and high costs of pharmaceutical products in less developed countries. Moreover, herbal remedies have attracted a great deal of attention as potential components of modern medicines for diseases such as HIV/AIDS, cancers, rheumatism, arthritis, and asthma. Thus for various reasons, herbal remedies are widely popular throughout the world.

Most of the plant matter used for medicinal purposes is collected from natural vegetation

stocks that are shrinking as habitats also shrink. Such declines in habitat have led to substantial reductions in plant material, as well as decreases in endemic species numbers. Environmental degradation, agricultural expansion, deforestation, and excessive resource harvesting in Ethiopia have combined to cause rapid losses of plant and animal habitats as well as species. Expanding human and livestock populations have also accelerated this trend, hastening the impoverishment of rural communities and the loss of biodiversity and indigenous knowledge.

Such losses of plant and animal biodiversity and knowledge in Ethiopia have aroused global concern. A full-scale plan to conserve, develop, and effectively use these resources requires investment commitments by government agencies, the private sector, and international development organizations. However, before such investments and support can be realized, information on the condition and economic value of resources is necessary. Thus a critical overview of medicinal plants in Ethiopia, the demand for such plants, and their trading potential and economic benefits is necessary. Such an overview will aid in clarifying the strengths, weaknesses, and opportunities in the medicinal plant sector and in creating recommendations for medicinal plant development.

1 Strengths, weaknesses, opportunities, and threats in the medicinal plant sector of Ethiopia (SWOT analysis)

While the medicinal plant sector in Ethiopia has many strengths and opportunities to enhance productivity and improve livelihoods, many weaknesses and threats remain to be overcome. These positive and negative aspects are summarized below.

○ **Strengths**

- Rich biological diversity of medicinal plants, allowing for selection of promising species suitable for cultivation
- Untapped, valuable indigenous knowledge on medicinal plants
- Availability for home consumption of easily accessible medicinal plants
- Well-established traditions of medicinal plant cultivation and methods for adapting plants to local environments
- Numerous traditional healers who can aid in the development of medicinal plants
- Large numbers of religious institutions and healers to collaborate in promoting the medicinal plant sector
- Farmers eager to cultivate medicinal plants, if developed
- High demand for medicinal plants due to the emergence or re-emergence of certain

diseases, high costs and limitations of modern medicines, desire for the environmentally friendly properties of medicinal plants, and chance to discover new medicines

- Biomedical benefits provided by medicinal plants, which are a product of knowledge accumulated over centuries

○ **Weaknesses**

- Efforts to conserve biodiversity are not producing desired results.
- Indigenous medical knowledge is enigmatic, and such secrecy prevents free knowledge sharing.
- Isolation of the active properties of medicinal plants is deterred by low scientific capacity.
- Poor mode of presentation of medicinal plants to patients
- Lack of a marketing infrastructure
- Underdeveloped system of marketing information
- Excessive dependence on the trade of medicinal plants may constrain conservation efforts.

○ **Opportunities**

- Further enhancement of economic benefits
- Further development of employment opportunities
- Possible motive for conserving biodiversity in natural and human-made ecosystems
- Active use of medicinal plants will contribute to the preservation of indigenous botanical and medical knowledge.
- The conservation of cultural and spiritual values will be passed on to future generations and contribute to the maintenance of cultural and natural assets of communities.
- Optimum utilization of rich indigenous knowledge on medicinal plants
- Development of the medicinal plant sector as an industry to generate income for poor households
- Improvement of Ethiopia's health care system
- Tapping into external markets
- Plant species of high international value, including *Prunus africana*, aloes, *Walburgia ugandensis*, and *Mystenus* species, might be marketable.
- Helping Ethiopia in its efforts to gain a high share in the international market for medicinal plants

○ **Threats**

- Ecological degradation
- Loss of indigenous knowledge
- Loss of cultural assets
- Threat of illegal smuggling and misuse of resources to medicinal plant conservation
- Lack of a suitable scheme for equitable sharing of benefits arising from biological resources
- An underdeveloped market may prevent cultivators from producing medicinal plants for the market.
- Traditional healers may not participate and fully collaborate.

2 State and potential of medicinal plants in Ethiopia: proposals

In Ethiopia, as in many other countries in similar circumstances, plans for medicinal plant development must consider the following: (1) the enhancement of human life, health, and happiness, (2) the ecological, cultural, and societal sustainability of local communities, and (3) the social acceptability of economic benefits. Such considerations will enhance the role of medicinal plants in societal, cultural, and economic contexts and help build stakeholder capacity. Considering these suppositions, in the following eight articles, we provide some observations and perspectives on the potential of medicinal plant development in Ethiopia.

1) Efforts to preserve and transfer indigenous knowledge

In most developing countries, including Ethiopia, indigenous knowledge of traditional medicinal plants and their uses has been passed from one generation to the next by word of mouth. However, many young people today have little interest in traditional knowledge of medicinal plants. Consequently, it is crucial to collect, compile, and preserve indigenous knowledge for future generations before this knowledge is lost. To that end, ethnobotanical and ethnopharmaceutical studies are necessary, through collaborations with scientists, relevant public agencies, and nongovernmental organizations (NGOs).

2) Promoting education and traditional health care methods

A first priority is education on the role and importance of traditional health care. Of particular importance is informing young people that traditional health care using medicinal plants is still an effective and important medical practice, that medicinal plants are important

sources of medicines, and that these plants hold great potential for future medical discoveries. Students should be fully informed of indigenous knowledge and traditional practices involving medicinal plants. We strongly recommend that school curricula incorporate diverse practical programs on traditional health care and medicinal plants.

3) Capacity building

Users and practitioners of traditional medicine encounter a number of constraints such as the seasonal availability of plants, shortages of finances, and lack of technical know-how. To overcome these constraints, external aid alone is not sufficient; further, the effects of outside aid are often not sustainable. Consequently, improving the capacity of those involved in traditional health care is imperative, through indigenous knowledge transfer and formal education on medicinal plants. To reach this aim, it is first necessary to identify and register traditional health care practitioners and note their status in social classes and groups. Identifying genuinely knowledgeable practitioners should help improve traditional medical treatment and practice throughout Ethiopia.

While many practitioners have already organized professional associations, principally in Addis Ababa, but also in other areas, these are still generally separate entities engaged in independent activities. A strong national association or cooperative for traditional medicine practitioners is highly recommended. Through such an organization, individuals could upgrade their capacities and participate in periodic training or other programs to improve their technical skills. Moreover, an overarching professional organization could provide traditional practitioners with basic training on modern medical practice, adding to their traditional medical skills. Skill upgrading programs could also teach agronomic techniques not directly related to medical practice. For medicinal plants to be commercially viable, we must not only verify their effectiveness but also educate practitioners to improve their technical capabilities.

4) Developing technology for cultivation and production

To develop the medicinal plant sector in Ethiopia, once genuinely effective medicinal plants are identified, they must then be effectively cultivated and processed. However, little technology has been developed for these purposes, except for a few cultivated medicinal plants such as turmeric and *khat*.

Further, particularly for plants collected in the wild, few measures have been established for their protection and conservation, and knowledge of their cultivation and production is practically nonexistent. Of special concern are plants harvested for their roots, tubers, and bulbs

that reproduce by vegetative propagation; to conserve these plants, we must identify and harvest only those parts that are more easily regenerated. Moreover, in terms of vegetation classification, attention should focus on Ethiopia's woodlands, which are the sources of most medicinal plants, followed by the montane grassland/dry montane forest complex.

In summary, to ensure sustainable and stable supplies of medicinal plant resources, technology and cultivation methods must be developed for medicinal plants that are in short supply.

5) Diffusion of technologies for processing, storage, and control of quality and safety

The most underdeveloped portion of the medicinal plant sector in Ethiopia is that associated with the development and diffusion of technologies for processing and storing plant material and for controlling product quality and safety. Studies on the standardization of medicinal plants should be conducted based on national health care guidelines and policies. Ethiopia should formulate its own safety standards and extend technologies to ensure compliance with those standards.

Further, legal standardization of appropriate quality-control procedures is also necessary to preserve and store large quantities of medicines derived from medicinal plants. Similarly, suitable packaging adapted to the physical properties of traditional medicines is required to sell these products.

6) Providing economic and market information

Medicinal plants and associated activities have not yet brought about satisfactory economic benefits for most Ethiopians, with the exception of the recent expansion of the market for *khat* as a nonessential grocery item. Indeed, for resource conservation and the continued use of medicinal plants in primary local health care, the generation of large cash benefits would arouse concern. Moreover, the medicinal plant sector has provided diverse benefits to local communities that cannot be expressed in monetary terms, such as health maintenance and enhancement. Future studies should compare the costs and benefits of traditional and modern medicines.

Considering the medicinal plant sector from an economic standpoint, it is desirable that market sites and retail outlets be established in production areas. Currently, Ethiopia has no formal markets that are publicly approved and legally protected and controlled either for medicinal plants or for the services provided by practitioners. Efforts are needed to formalize not only the services provided by practitioners and vendors, but also for medicinal plant

products, while considering the risk of monopoly of products and knowledge and respecting the diversity of communities and ethnic backgrounds.

Furthermore, most individual farmers do not have access to accurate information on the commercial value of medicinal plants. This situation should be remedied as soon as possible by providing not only the previously mentioned opportunities for technology transfer, but also a mechanism to facilitate communication among market participants. The establishment of a market information system and business linkages would also aid in capacity building of stakeholders.

7) Structural and institutional interventions according to needs

To realize the recommendations proposed above, structural and institutional interventions by the government or other administrative authorities are called for, in accordance with voluntary efforts by those involved in the sector. For example, the introduction of a system to register and license traditional health care practitioners would greatly facilitate the implementation of official measures to support this sector. However, in organizing those involved in traditional medicine, social and cultural factors must be carefully considered to ensure good accord between the newly introduced system and existing conventional systems. To that end, knowledge obtained by cultural anthropology and ethnobotany studies should be fully exploited.

Furthermore, an environment conducive to assisting practitioners of traditional medicine should be created so that traditional and modern medical practitioners can coexist collaboratively and complementarily, with the latter recognizing the role that the former have played in addressing prevalent diseases such as respiratory infections, diarrhea, malaria, tuberculosis, sexually transmitted diseases, trypanosomiasis, leishmaniasis, schistosomiasis, and other parasitic diseases.

8) Promotion of community-based resource management

Lastly, we note the overt and latent benefits enjoyed by local communities as stages for traditional treatment using plants. Medicinal plants have played significant roles in local communities in Ethiopia in three main ways: enhancement of health and welfare; sustainability of natural and cultural resources; and economic value. For community members, accessible medical care and products have been indispensable in maintaining life and health. Moreover, medicinal plants in use for generations reflect the sustainability of natural and social environments in which a community is situated. Furthermore, since these medicines are

generally inexpensive and can be obtained close to home, the users of medicinal plants gain economic benefits. Practices of traditional medicine also create employment opportunities and provide income for both practitioners and vendors.

Despite the benefits to local communities and the ecological, societal, cultural, and economic importance of medicinal plants, conservation of these plants and the traditional knowledge of their use have generally been neglected. Further, there is little knowledge of the additional potential benefits of traditional medicinal plants and little government support for such research. However, despite this, the government should not hesitate to intervene with administrative measures to improve medicinal plant use and address problems confronting local communities.

Particularly, for the conservation of medicinal plant resources and their sustainable use, various relevant studies suggest that, in collaboration with local communities and relevant organizations and individuals, plans for natural resource management should integrate requirements for the sustainable harvesting of medicinal plants.

The original document of Chapter 2, the report produced by Dr. Endashaw Bekele, is now available online at http://www.jaicaf.or.jp/ publications/Ethiopia_ac.pdf

Chapter 3 Status of useful crops in Ethiopia, current issues and future potentials

This chapter presents the present status and future issues and potentials for a certain number of crops that have been selected from among those currently cultivated usefully in Ethiopia, with the selection criteria that they particularly hold promise as sources of income, and that as of now diverse cultural practices and distribution systems for them have been developed and can be expected to be applied to other crops.

1. Coffee

1) Characteristics of Ethiopian coffee

Coffea arabica originated in Ethiopia and all the varieties grown in the country have derived from the huge gene pool of indigenous coffee species and varieties (more than 3,500).

The coffee production systems in Ethiopia can be classified into 4 types: (1) Forest (a system where products are harvested from wildcoffee trees in the tropical rain forests); (2) Semi-forest (a system with a higher degree of human intervention of forest management); (3) Garden (a system which is managed the most intensively by farmers with 2-3 times of weeding, along with the practice of fertilizer application); and (4) Plantation. Considering that most of production comes from the activities of smallholder farmers, and the traditional production systems tend to have affinities for biodiversity, the first 3 are more important for preserving the biodiversity than plantation.

2) World coffee market and Ethiopia

(1) Overview of the world market

Currently the world coffee market is suffering from chronic oversupply. Since the 1950s, in comparison to the yearly growth rate of consumption at 1-2 %, the production has shown a higher growth rate than that figure.

Although the volume of consumption undergoes little change, the consumption pattern has become diversified. On the one hand, the demand for low-price coffee is increasing as a result of improvement of taste, on the other hand, among Arabica varieties, various niche markets for high quality coffee, such as specialty (gourmet), fair-trade, organic or eco-friendly coffee, are growing.

(2) Coffee in Ethiopia

The coffee production in Ethiopia for 2005/06 season is approximately 300,000 tons. This represents the figure for the fifth largest producer in the world but accounts for only 4 % of the world total production, having little impact on international prices. Coffee provides the principal source of earning foreign exchange and accounts for 35 % (2005/06) of the value of exports of Ethiopia although almost half of production is consumed in the domestic market.

3) Current situation of coffee in Ethiopia

(1) Economic liberalization and international price fluctuation

Since 1991, the EPRDF has adopted the liberalization policy on the marketing and prices of coffee. In consequence of exchange rate liberalization, the coffee price increased substantially for the producers paid in the local currency of birr. At the same time, however, they have been exposed directly to the drastic fluctuation of international prices. Such a situation has caused a great impact not only on producers but also on merchants and exporters. Owing to the poor state of the infrastructure of road transport within the country, it takes time for the local merchants to deliver the products to exporters. They have experienced the substantial loss at the time of the fall of international prices due to the time they spend for internal transportation.

(2) High added value

In order to improve the overall quality, it has been well recognized that it is essential to improve the technology of processing coffee. The national development policy for 2005 to 2009 (“Plan for Accelerated and Sustained Development to End Poverty”, PASDEP) has also planned of the assistance for technology improvement. Since we aim at contributing to high profit agriculture, we present some of ongoing activities conducive to a higher added value of products.

a. Organic coffee

Regarding the production of organic coffee, Ethiopia holds a superior position to other coffee production countries. The advantage derives from various factors: as the country where Arabica coffee originated, it is endowed with a large population of diverse traditional varieties; the government has also actively promoted coffee improvement; and furthermore, aided by poverty, the rate of utilization of fertilizer has been low, so that the majority of coffee in Ethiopia has virtually been grown organically.

As a consequence, all that is needed for the certification of organic coffee is only the cost for the procedure of acquisition of the certificate, dispensing with all other special costs

otherwise needed for growing organic coffee. The amount of organic coffee exported from Ethiopia in 2005 was about 9000 tons, accounting for 19 % of the total value of exports of organic coffee in the whole world and 6 % of the total volume of exports of Ethiopia.

b. Fair-trade coffee

As the most effective means to buffer the impact of international price fluctuation, we can cite the channel of fair-trade coffee. Although the share of fair-trade coffee in the world coffee market is still very small, accounting for only 1 % , the market is rapidly expanding, especially in the U.S.A.

Most cases of fair-trade coffee in Ethiopia utilize the system of certification by FLO (Fair-trade Labeling Organization). Since the condition for acquisition of the certification by FLO requires the establishment of an organization of producers, cooperatives are playing the principal role for the fair-trade initiative in Ethiopia.

Considering that the share of fair-trade coffee in the world market still remains small, it is difficult for Ethiopian coffee cooperatives to quickly get the share in the fair-trade market. Besides, cooperatives, lacking sufficient operating funds on their own, can purchase only a limited amount of products. Consequently, the volume of exports taking advantage of the FLO certification system was estimated to remain around 5000 tons in 2005, accounting for only 3 % of the total volume of coffee exports from Ethiopia.

c. Internet auction

As a means of transactions at equitable prices between producers and roasters or other buyers, the auction through Internet should be taken into account. In Ethiopia, since 2005, an Internet auction organized by a group called “eCafe Foundation” has been in operation. Principal sellers are coffee cooperatives that are also playing the central role in fair-trade., The combined results of 2005 and 2006 having amounted to more than US$ 430,000.

d. Trademark registration

Trademark registration is an effective means for the purpose of protecting the value of a brand name and at the same time establishing the brand to assure the benefits. Regarding Ethiopian coffee too, the Ethiopia Intellectual Property Office has been actively engaged since 2004 to register the trademarks of *Yirgacheffe*， *Sidamo* and *Harrar*, in many countries in the world.

OXFAM estimates that the trademark registration will enable the growers to increase their income by 88 million US dollars per year, but no license fees so far have been imposed in particular. There has occurred an ironic situation that the conflicts with Starbucks and National

Coffee Association in the US regarding the trademark registration has aroused the public interest and contributed to the increase of traded volume and the rise of prices. Moreover, the procedure how the profit shall be returned to growers when the license fees shall be imposed is yet to be defined at the moment.

4) Issues and potentials of Ethiopian coffee

To seek the potentials for higher profit in the coffee industry in Ethiopia, a more advanced level of processing should be considered, rather than the export of raw beans.

However, it is difficult to launch roasting beans for ordinal beverage in Ethiopia because of the short durability of quality (around 2 weeks) and the difficulty of blending with the products from other countries. Hence, we should explore other uses than ordinary beverage. At this stage, we confine the argument to the presentation of latent potentials only, citing a few possible instances. Further study is needed to examine the feasibility and profitability of these options.

a. Functional food: As mentioned in Chapter 1, coffee is rich with chlorogenic acid, effective in antioxidant effects, and mannan oligosaccharide which support the intestines to function actively. Coffee is one of the functional foods which attract attentions in the recent health conscious trend. There is a possibility that the selection of the varieties with high contents of these ingredients among the diverse coffee varieties in Ethiopia would lead to the creation of new brand commodities characterized with their health attributes. Alternatively, it may also be worth considering to develop supplements by extracting the essence, considering the technology of the extraction has already been in practical use.

b. Processed foods: Although at the initial stage the market will be confined to domestic consumption or tourists, the manufacturing of products bearing the name of Ethiopian coffee, such as coffee jelly, coffee liqueur, coffee candy, or honey of coffee flowers, would be considered.

The feasibility research needs careful examination in collaboration with government institutions such as the Ethiopian Institute of Agricultural Research or the Ministry of Agriculture and Rural Development. Furthermore, for the practical feasibility, the collaboration with growers will be critical. A joint effort with the Coffee Farmers Cooperative Unions, as a leading counterpart organization, should be considered. In spite of the fact that it still suffers from uncertainty in the aspect of logistics and sustainability, the Unions are functioning as

organizations of coffee growers, and hence, would be probably the most effective route to work with producers at the moment.

2. Frankincense, myrrh and natural resins

1) Utilization of natural gums

Natural gums are milky liquid resins which are exuded by slashing barks of trees, and quite a few of them constitute important raw materials for pharmaceutical and industrial products. Ethiopia produces gum olibanum (frankincense), gum myrrh, gum Arabic, and gum opponex. Gum olibanum and gum myrrh are mainly used as incense goods and used to be highly valued as medicinal products. Gum arabic is used as a raw material for adhesive agents, food additives and as a coating substance of tablets in manufacturing of pharmaceuticals. Gum oppoponex is utilized principally as a medicine. In this section, explanation shall be focused mainly on gum olibanum and gum myrrh that are produced in a large quantity in Ethiopia.

2) Production of natural gum resins

The tree species producing gum olibanum and gum myrrh in Ethiopia are distributed principally in arid regions, at 200 to 500m above sea level, extending from the northeastern to the southeastern part of Ethiopia.

The amount of actual production of natural gum resins in Ethiopia is reported to be 10,000 tons per year. On the other hand, their potential annual production is estimated to amount to 32,010 tons, comprising 13,910 tons of gum olibanun, 8,000 tons of other gums including gum myrrh and gum opponex, and 11,000 tons of gum arabic.

According to what has been learned through interviews with trading firms conducted by the field survey mission, the production of gum olibanum or that of gum myrrh is liable to be influenced by climate and is on the decrease in recent years. It is said that gum myrrh, in particular, has been hardly produced in the past few years on account of adverse climate, and the stock of the highest quality products has completely run out .

Gum olibanum produced in Ethiopia is classified into 5 or 6 grades, varying depending on traders, with criteria of quality, such as the grain size, whiteness and components contents, and the price differs according to the grade. High quality gum olbanum is defined as that with (1) large grain, (2) intense whiteness, (3) low impurities contents, (4) high components contents.

3) Status of export of natural gums in Ethiopia

The number of enterprises engaged in the production of natural gum resins is 30 including agricultural cooperatives in Tigray State, principal producing area, and 14 in Amhara State. The enterprises in the export business number about 10. From 2 companies among them, the survey mission obtained commercial samples of gum olibanum and conducted an independent evaluation (see Chapter 4).

Moreover, some statistics and investigations reveal that China and India import cheaper products and countries in Europe, Middle East and Latin America import high quality products from Ethiopia.

4) Issues in the production of natural gum resins in Ethiopia

(1) Collection method dependent on manual labor and the quality

The largest part of the total labor of production of gum olibanum is devoted to its collection. It is said that 500 grams of gum olibanum are collected from a single tree of gum olibanum. Consequently, at least 2000 trees of gum olibanum need to be treated to collect 1 ton of the gum.

It should be noted that the collection work is a critical process that determines the quality of gum olibanum. Our evaluation of the quality of commercial samples of the gum olibanum produced in Ethiopia has demonstrated that the highest ranked product "1st grade gum olibanum" is equivalent to the lowest one "4th grade gum olibanum", as regards the inclination of scent and the overall quality. However, the 4th grade gum olibanum contains large quantities of impurities and is not suited to distribution in Japan (Chapter 4).

The relationship between the quality and the collection method is as follows:

(i) Collection is made directly from the resin accumulated on trees (1st grade)

(ii) Collection is made from the resin deposited on stones placed on the ground under trees (2nd grade)

(iii) Collection is made from the resin dripping from trees and left on the ground (3rd grade)

The method (iii) cannot evade the contaminations of impurities such as sand or pebbles, and even those by (i) and (ii) also are liable to cause contaminations while collectors wait for the resin to exude. Furthermore, these primitive methods are influenced by winds and rains, always subject to the risk of loosing the resin.

(2) International price competition and lack of labor

The actual production of natural gum resins in Ethiopia is only around one third of the potential capacity of production. The main reason behind the circumstances is the fact that efficient production methods have not yet been established and the production processes still

depend solely on manual labor in many producing areas. On the other hand, there is a situation that because of the international price competition, producers cannot adopt a high level of wages owing to the necessity to lower the production cost, consequently being unable to acquire sufficient manpower. The current production system depending on human labor is caught in a dilemma of the need to recruit labor or the need to reduce cost. Moreover, almost the total amount of natural gum resins produced in Ethiopia is exported as raw materials, without undergoing any secondary processing within the country. The situation like this only lowers the profitability of the production of natural gum resins, consequently making it impossible to dare to invest in research and development of the production technology and for the stable recruitment of labor force.

(3) Environmental degradation and the awareness gap of people

If one looks at the social situation surrounding the production of natural gum resins, it is recognized that the population growth in Ethiopia entailed the trend of deforestation of natural forest and conversion to arable lands. Although universities and public agencies having sense of crisis about the environmental degradation are trying to plant trees to produce gum olibanum and gum myrrh, the survival rate of planted seedlings is low, and reforestation is not progressing so fast as it has been projected. Moreover, the farmers and inhabitants in production areas who are essentially beneficiaries of the production of natural gum resins, with respect to tree species of the gum resins, would rather use them as sources of firewood than use them for collecting resins in a sustainable manner. If such a situation continues, it is imaginable that in Ethiopia, too, at some future day, grave reduction of resources of natural gum resins will become inevitable.

5) Propositions for the production of gum olibanum, gum myrrh and natural gum resins

(1) Principal products to be exported to Middle East and Europe

The international price competition is settled by the difference in capital strength. Price competition is only temporary and, after all, products of a higher quality essentially win the favor of market. Because Ethiopia produces high quality products that are strong in the market in the Middle East and the West, it would be strategically preferable to focus on winning superiority in the market by supplying high quality products.

Moreover, the resources of tree species producing gum olibanum and gum myrrh are on the decrease in the world, and in the production areas on the coasts around the Arabian Peninsula, the governments are actively engaged in protection and nurturing of the resources. In the future, it is expected that gum olibanum or gum myrrh of high quality becomes difficult to obtain. Under such circumstances, too, it will be a beneficial strategy to produce high quality

products.

(2) Development of efficient and sure method for collection of resins

Considering the fact that the quantity of production from a plant is fixed and the available labor is limited, it is essential to develop the method to collect all the resin exuded out of trees without contaminations with impurities, if a higher production capacity and an improvement in quality are to be realized. It is needed to make efforts in research and development on the means, harvesting timing, harvesting method and collecting tools that will ensure producers to retrieve completely the product without leaving anything. Such an approach will bring about en effect that producers not only can make an efficient use of laborers but also can prevent inadvertent damages and exhaustion of trees.

(3) Nurturing industry and enhancement of awareness of resources conservation

Even if the techniques for cultivation of trees for producing gum olibanum and gum myrrh are established in Ethiopia, the loss of these resources is inevitable, unless the farmers engaging in the production and the people living in production areas develop their own interest in the resources of natural gum resins and possess the awareness of their conservation. Natural gum resins in Ethiopia, promising resources in the aspect of profitability, need to be treated as objects of the efforts for resource conservation for sustainable production. For that end, it is required to increase the profitability of their exploitation by exporting the products after processing them within Ethiopia, instead of, as till now, exporting them simply as raw materials. The approach should not only be intended to provide returns to producers but also be interpreted as a means, by developing the processing industry, to expand the base of laborers engaging in the production of natural gum resins. It could be reasoned that the effort to increase the numbers of people and areas committed to natural gum resins is an effective means that eventually develops a better understanding of the importance of such resources.

The matters of replanting trees and forest management require long term planning extending over 20 to 30 years. This period corresponds to a generation of human being. Consequently, it is important to return to laborers and local people in a visible form the benefits deriving from the production of natural gum resins.

3. Eucalyptus

1) Basic facts about eucalyptus

Eucalyptus commands a broad spectrum of utilization as a raw material for paper pulp, firewood, materials for building houses, furniture, telegraph poles, railroad crossties, pit props, plywood, tar, etc. Moreover, its usefulness as a timber resource is related to diverse utilizations by extraction of essential oils as raw material for paints, perfume oils, cosmetics, disinfectants, etc.

The afforestation of eucalyptus, however, is often criticized for environmental degradation, such as depletion of headspring function, soil deterioration, injurious effects on other plant species by the harmful secretion from leaves, the ecological destruction due to afforestation with a single species of eucalyptus. However, it is pointed out that these issues would not be confined to eucalyptus, but would also exist in the afforestation with other fast growing species.

2) Eucalyptus in Ethiopia

(1) History of afforestation

The history of afforestation with eucalyptus species in Ethiopia goes back as early as the era of Emperor Menelik II at the end of the 19th century. The Imperial Court until that time used to lead a nomadic life, in which it simply repeated the cycle of exhaustion of wood vegetation around the court, followed by migration to a next place. The living style changed as a result of the afforestation with eucalyptus, and it enabled Addis Ababa to become the permanent capital city.

When Emperor Menelik II introduced eucalyptus, he tested more than ten varieties, and among them two varieties currently have been cultivated widely, *Eucalyptus globules* (common name in Ethiopia, white eucalyptus) and *E. camaldulensis* (red eucalyptus).

3) International market and eucalyptus

The main usage of eucalyptus in Ethiopia is essentially for firewood and building materials. Seeking for higher profitability, export potential should be explored. Here we would like to examine the trend of current international market as regards the “eucalyptus oil” and “raw materials for pulp making”.

(1) Eucalyptus oil

It might have a potential for eucalyptus oil because it mainly uses leaves which do not compete with existing usage. Considering that eucalyptus in Ethiopia (particularly, *E. globules*) is not currently suffering from diseases or insect pests, it has high potential for organic oil.

a. Usage of eucalyptus oil

Eucalyptus oil is extracted from leaves and twigs by the steam distillation method. Some species of eucalyptus are preferred for oil because of their characteristics in aroma. Principal ussages of eucalyptus oil are for medicines and perfume.

① Usage for medicines：

The value of eucalyptus oil as a medicine is determined by the cineol content. For the medical usage, it has to conform to the strict pharmacopeias based on the international standards as well as on the standards of the consuming country. However, this part of the issue concerns manufacturers who manage refining processes rather than the producers.

While there are hundreds of Eucalyptus species containing oil, mainly 6 species constitute the principal source of eucalyptus oil. Among them, 2 species are mainly used for afforestation in Ethiopia, *E.globulusu*，*E.camaldulensis*.

② Usage for aroma chemicals:

Eucalyptus citriodora is mainly used for aroma chemicals. The unique characteristics of the species for aroma oil lies in the content of citronellal instead of cineol for medical oil. The aroma chemicals are used as fragrance mainly in low price soap, perfumes or disinfectants.

b. International market

China is the leading producing country, accounting for 70 % of the medical oil, and for two thirds for the aroma oil. Although it is difficult to have accurate trade statistics , the world market for the eucalyptus medical oil in 1991 is estimated to be about 3000 tons of production and 2000 tons for export. As for *E. citriodora* for aroma, the estimated figures are 1500 tons of production and 500 tons for export.

Principal importers are EU countries, importing 2646 tons in 1990.

International prices are greatly influenced by the production in China. The oil with content of 80 % -cineol produced in China was quoted at US$ 6 in 1989 but the price dropped down to as low as US$ 3 in early 1994. When a new country intends to participate in the world market, it has to compete with the low price level of China.

(2) Raw material for making pulp

E. globulus widely planted in Ethiopia is suited to making pulp.

However, it is quite difficult to secure high profitability for producers who are mostly small scale farmers. In order to secure the profit, the scale of cultivated area makes an important factor. In Thailand, farmers operating eucalyptus plantations own an average of 13 ha of total

land and out of 13ha, 8 ha for eucalyptus. Unless farmers own sufficient land, they cannot opt for cultivating eucalyptus that needs 5 years until they can harvest it. In view of the reality that the average land area owned by farmers in Ethiopia is 1.2 ha, with 99 % of farmers owning less than 5 ha of land, it will entail a lot of difficulties to export “eucalyptus chips” as a raw material for making pulp.

4) Issues and potentials for eucalyptus in Ethiopia

In Ethiopia the afforestation with eucalyptus is carried out by individual small farmers or by rural communities. The utilization is confined to firewood or materials for building houses. Considering that no particular problems exist regarding diseases and insect pests, which allows the organic cultivation, and that *E.globulusu* which is thought to be suited for producing oil is one of the main species widely cultivated in Ethiopia, there is a potential for the production of eucalyptus oil. Moreover, in view of the fact that the oil production makes use of leaves that are currently discarded as wastes or partly used for fuels, it can be a new source of income for farmers.

However, it is estimated that the annual production of 40 to 50 tons of oil has to be secured to get going a processing plant. It is roughly estimated that at least 45,000 tons of fresh leaves are needed for the production of 40 to 50 tons of oil. This is equal to 3000 ha afforestation with eucalyptus. It might be possible, considering that the total afforested area in Ethiopia amounts to 250,000 ha, but a more detail study should be required. Furthermore, as shall be discussed in Chapter 4, considering the fact that Ethiopia had an experience of an attempt to refine eucalyptus oil, it would be also important to explore a refining method utilizing appropriate technology.

More concrete study for the distribution channels and quality is also essential. The durability of materials, especially, maintaining the quality of fresh leaves, crude oil and refined oil, at respective stages of processing, needs to be examined, taking into account the climatic conditions and poor transport infrastructure in Ethiopia.

Finally, although it is not confined to the case of eucalyptus, the projects with high profits agriculture demand capital. There is a high risk that the net results do not always benefit the small peasants who really need the support, but rather end up with assisting existing investors who already possess ample funds on their own. Therefore, careful examination is needed in selecting a suitable target in proceeding for the collaborative activities. One of the options will be a joint project under the collaboration with one of the cooperatives whose activities have become more vigorous since the enforcement of “Cooperative Act” （No.197/1998）.

4. Sweet wormwood

1) Anti-malarial measures by WHO and the cultivation of sweet wormwood

Recently it has been found that artemisinin contained in sweet wormwood, *Artemisia annua,* shows anti-malarial activity, and is more effective as an anti-malarial drug with low toxicity compared to conventional chloroquine. Currently the most effective drug against the drug-resistant strains of malaria parasite is a drug combining a derivative synthesized from artemisinin. WHO is conducting a campaign to promote ACTs (Artemisinin-based Combination Therapies) to combat the infection by malaria.

However, the drugs for ACTs are not supplied in sufficient quantities to meet the demand from all the countries. Particularly, the drugs for WHO activities are short in supply and the increased production of sweet wormwood used as a raw material for the drug is being desired.

2) Cultivation of sweet wormwood

In Ethiopia, the Essential Oil Research Center of the Ethiopian Institute of Agricultural Research has started a research program aiming at the cultivation of sweet wormwood in the country. For this year, it has set up 6 experimental fields throughout the country, conducting a study to identify characteristics in order to select areas suited for the cultivation.

3) Issues on cultivation of sweet wormwood

Studies on cultivation of sweet wormwood are going on in research systems in many countries. WHO published guidelines in March 2007 on the cultivation of sweet wormwood (*WHO Publishes guidelines on cultivating essential plant used in anti-malaria medicines.* WHO monograph on good agricultural and collection practices for *Artemisia annua L.).*

Since sweet wormwood is a cross-pollinating (xenogamous) plant species, variations among individual plants in artemisinin content and plant growth are great. Regarding the artemisinin content in leaf, certain plants contain no amount of artemisinin at all, while certain selected strains of sweet wormwood from China have a very high level of artemisinin content. In future, in order to improve the productivity in artemisinin of the plant, it is important to breed strains that are adapted to growing areas and have high artemisinin content.

4) Potentials for development of new types of medicines derived from sweet wormwood

It has been demonstrated that the trioxan dimers chemically synthesized from artemisinin contained in sweet wormwood have not only high anti-malarial activity and low toxicity but also antitumor activity. The artemisinin contained in sweet wormwood has potentials for the use as a raw material for pharmaceutical processing not only for antimalarial agents but also for antitumor agents, making the plant species a very promising commodity as resources for creating medicines.

<Annex> Potentials of ensete fiber as product of a high profit crop

Ensete (Abysinian or wild banana, also *kobe* in Amharic) is a plant originating from Ethiopia, distributed widely and growing naturally in many parts of Asia and Africa. It is an herbaceous plant resembling banana in morphological features, with the plant height sometimes reaching up to 5 m. While it takes normally several years to grow ensete from planting seeds to harvest, it has been domesticated only by the farmers in the southern part of Ethiopia who have developed particular cultural techniques to grow it in a short period and harvest it in large quantity. People in Ethiopia use as staple food the starch processed from its corm and pseudostem. Except for the use as food, pseudostem, leafstalk, leaf and the fiber deriving from pseudostem is processed and used. In addition to the frequent general use of its leaf as a material to wrap things in markets, the leaf is traded on a large scale by the intervention of middlemen in certain areas.

The objective of this report is to discuss the potentials of ensete as a high profit crop, based on the field survey carried out for some two weeks in mid-August, 2007, in the southeastern part of Ethiopia (areas surrounding Awasa), and also on the subsequent laboratory experiment on the ensete fiber conducted in Japan.

On the occasion of visit to the processing plants of ensete during the survey, researcher's interest was aroused by the characteristics that the crop can be harvested all year round and it is highly productive (estimation indicates that a single plant can satisfy the need of feeding a family of four persons for one month). He focused his attention on the fiber which remains after starch has been extracted. As the wives of households at Sidama that the researcher visited used iron paddles to extract the starch, the fiber was chopped up in the process, apparently showing no signs that indicate that any processed products which retain the state of long fiber are either shipped to markets or used for domestic purposes. In a periodic market in a village surrounding Awasa, a bundle of fiber was being sold for about 30 yens, but the business scale was quite small.

Here we present the characteristics of the ensete fiber, based on laboratory tests on its physical properties. The experiment has demonstrated the following three points:

(1) The ensete fiber contains moisture of approximately the same level with that of silk and hemp.
(2) The diameter of yarn can be similar to that of silk, but the thickness of fiber itself is variable.
(3) The fiber and twisted yarn do not elongate so much as cotton. Regarding the tension strength of two-fold yarn, cotton and ensete are almost of the same level.

Moreover, with collaboration of a fabric-dyeing artist, the fiber of ensete acquired in Ethiopia was processed into textile yarn. The fiber was immersed in water to impregnate it with moisture. The

moist fiber fragments are pieced together and twisted to make yarn. Since this procedure enabled the whole operation to proceed at relative ease, the processes have been organized specifically as follows:

(i) A bundle of fibers is divided equally into small bundles
(ii) Small bundles are immersed in water for one to two minutes.
(iii) Fibers are taken out one by one and pieced together by weaver's knot or by twisting.
(iv) While fiber fragments are being pieced together, linked fibers are twisted by spinning wheel (*chalka*) to make yarns.

In succession to the above study, alternative methods of fiber processing are being experimented, including the process of extracting fibers and that of making yarn, based on traditional procedures. And furthermore, experiments are going on to find the method of dyeing ensete fiber by using plant materials available in Ethiopia.

People in Ethiopia has cultivated ensete for many generations and made good use of it in their own life. However, the utilization of ensete fiber still remains at a very low level, and its characteristics are not yet duly appreciated and utilized profitably.

In the future, more detailed experiments on its physical properties shall be repeated to make it possible with certainty to develop products that will make full use of its characteristics. In many parts of Ethiopia there are currently weavers referred to as "*shanmani*" who are actively operating in their profession. Therefore, it would be alternatively possible to take up an approach to develop the products of ensete fiber and yarn, based on the conventional technologies practiced by them.

Chapter 4 Expectations for medicinal plants in Ethiopia and potentials of Japan's cooperation

1 Strategy for high profit agriculture

In order to develop the kind of agriculture that enables producers and local communities to earn sufficient profit, so-called "high profit agriculture", there are two questions to be answered. The first one is "What to produce?", and the second, "Where to sell (market)?" In addition to these, in the distribution process of products, the method of processing of basic raw materials and the method of commercialization of them according to the market demand also make up the questions.

In considering the model of high profit agriculture based on medicinal plants in Ethiopia, the objects of production can be classified according to the countries of origin into "medicinal plants indigenous to Ethiopia", "medicinal plants indigenous to Africa" and "medicinal plants non indigenous to Africa" (Fig. IV-1). Medicinal plants indigenous to Ethiopia would be easier to cultivate and put to commercial production, compared with those originating from other regions, in view of the natural environment, climate and soil, the extent of recognition and the state of utilization by Ethiopian people. On the other hand, as for the plant species which are neither indigenous to Ethiopia nor cultivated there, the research and testing for determining cultivation techniques and their extension to producers take a certain period of time, and hence the initial investment and time will be required.

Factors of the second question, "selection of market", can be classified according to the distance to and the scale of market into "local market", "domestic market" and "international market". The scale of these factors expands successively in the described order, and hence it is expected that the scale of profit also expands. On the other hand, producers have to maintain the level of production commensurate with the scale of market, and take risks corresponding to the expanded scale. Particularly in the international market, producers are required to predict the trend of consumers, meet their demand and conform to the international standards in terms of safety and quality of the products.

The objective of high profit agriculture is to guarantee equitable profit corresponding to the labor expended by actors at different stages of production/distribution, producers, regions and the state respectively. Consequently, if the model of high profit agriculture is envisaged by the combination of a limited number of variables comprising "products" and "market", the most effective combination consists of the production of "medicinal plants indigenous to Ethiopia" and the shipping of products to "international market".

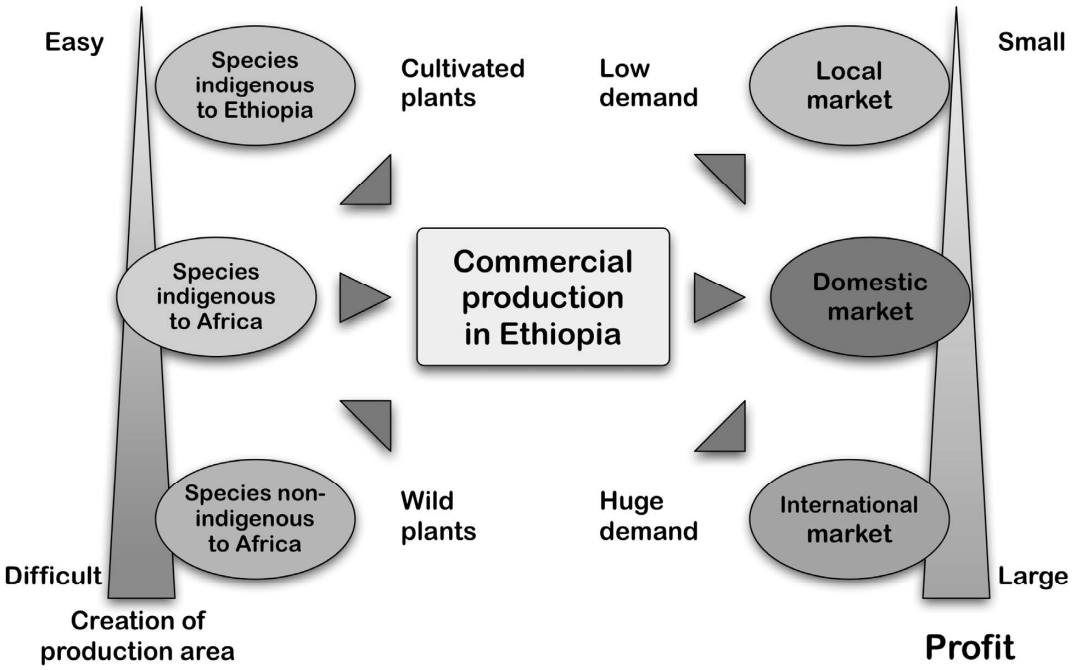


Fig. IV-1 Schematic diagram of strategy for high profit agriculture

2 Realization of the production system to ensure “safety” and “quality”

The objective of the production of medicinal plants is their use for the maintenance and enhancement of health and the treatment of diseases, and their utilization as raw materials for deriving pharmaceutical products. It is known that the forms and contained compounds of medicinal plants vary depending on factors including cultivation techniques, harvesting time, portions of utilization, and methods of post-harvest processes.

Because of the particularity of their use, the product safety of medicinal plants and processed products is extremely important, requiring always the maintenance of production of products with constant quality. Not only in Japan, but in international market, if the products processed from medicinal plants are to be distributed, their quality needs to be controlled from the viewpoints many of which are different from those applicable to ordinary agricultural products.

World Health Organization, WHO, has published monographs, “GOOD MANUFACTURING PRACTICES, GMP (2005)” and “Quality Control Methods for Medicinal Plant Materials, QCMMPM,(1998)”, as guidelines for the cultivation and quality evaluation of medicinal plants, promoting the quality control procedures conforming to these guidelines. These publications have specified the standard practices that producers and enterprises have to

observe in their operation, regarding the cultivation fields, manufacturing facilities such as factories for processing raw materials, and quality control, as the means of guaranteeing the quality including the safety of medicinal plants and products processed from medicinal plants used as raw materials.

In Japan crude drugs which are derived from plants and used to prepare prescribed Chinese medicines, and raw materials for pharmaceutical products are strictly regulated regarding their forms and quality in the Japanese pharmacopeia. Furthermore, as guidelines for cultivation practices processing procedures, "Cultivation and quality control of medicinal plants" has been published to promote the improvement of product quality.

As means for achieving high profit in agriculture, there are two strategies, "intensification of production" and "high added value". Moreover, in the case of products processed from medicinal plants, it is important to give the highest priority to "safety", and in order to achieve this objective, it is needed to make actors comitted in the production recognize well the basic concept of "quality control". In order to put into practice the "quality control", the Government and public organizations have to formulate and extend the method of quality evaluation, conforming to the guidelines of GMP and QCMMPM or the international standards.

In the case of medicinal plants, "safety" and "quality" make the highest added value, it is evident that these properties would not only serve the objective of export to the international market, but also lead to the improvement of health and medical services of Ethiopian people.

3 Cases of development of high profit agriculture

1) High profit agriculture drawing on medicinal plants in Ethiopia

(1) Extension of Ethiopian medicinal plants based on coffee as a key element

a. Potential value of Ethiopian coffee

Regarding many of agricultural products, Japanese people tend to appreciate highly the added value of what they call "things natural", paying high prices for such articles. Coffee beans collected from native plants in Ethiopia, where coffee originated, are genuine "things natural", that is an added value for which no other countries can legitimately rival. Consequently, it would be desirable to adopt a strategy of distribution, drawing on such an added value.

At least more than 60 strains of genetic diversity of the coffee tree have been confirmed in Ethiopia (Brazil, major world coffee producer, has 2 strains). The number of principal coffee producing areas in Ethiopia is 5, including Harrar, Sidamo, etc., but in view of the genetic diversity, it is possible to create a larger number of further differentiated areas producing

specialties.

The genetic diversity in Ethiopia signifies the affluence of breeding materials, suggesting a great potential for development of new varieties in the future. Ethiopia is endowed with the superior resources that it is able to create new varieties with taste and flavor responding to the needs of consumers, in which no other country can compete.

Coffee from Ethiopia possesses a high added commercial value of "country of origin" and "affluence of genetic diversity" that no other country has, promising an extremely huge potential for Ethiopian coffee.

b. Culture of Ethiopia and the use of medicinal plants as observed in "Coffee ceremony"

The manner of taking coffee in Ethiopia is quite unique. Particularly, the occasion of coffee taking arranged for receiving visitors is called "coffee ceremony", a kind of ritual and religious formality, making one feel a culture.

In the coffee ceremony, several important medicinal plants are used. After finishing roasting coffee beans, while visitors are entertained by fragrance of burnt scents such as gum olibanum or gum myrrh, the water for brewing coffee is boiled together with spices like seeds of korarima (*Aframonum corrorima* Jansen) added beforehand, to give it particular flavor and aroma. Moreover, sometimes coffee is taken together with leaves of tena adam (common rue, *Ruta graveolens* L.) floated in the cup. The role of coffee ceremony is not restricted to the simple act of drinking coffee, but the ceremony represents a high level of cultural characteristic, incorporating the sensuous pleasure of smelling fragrance of roasted coffee and burnt gum olibanum, and "offering hospitality to visitors" through variation and elaboration of taste and appearance by adding medicinal plants like korarima or tena adam to coffee.

c. Dissemination of Ethiopian medicinal plants by drawing on "tradition and culture"

When the dietary habit and the historical and cultural background are different, it needs an ingenious method to penetrate into the market in another country and disseminate agricultural products, particularly medicinal plants, of one country. Regarding Ethiopian medicinal plants, one can suppose, for instance, that one intends to sell korarima in Japan. The spice korarima uses the seed of a plant of ginger family, having a very pleasant fragrance resembling that of cardamom.

In Japan the custom of drinking coffee has already been established and integrated into daily habit. Ethiopia is the country of origin of coffee, and besides has a characteristic culture called "coffee ceremony". As a means to disseminate and establish Ethiopian medicinal plants in Japan, the key to solution would be the utilization of the added value and culture that Ethiopian coffee possesses (Fig. IV-2).

The real beginning of Ethiopian coffee lies in the coffee ceremony where Ethiopian medicinal plants are used for adding flavor. That is to say, in order to taste the authentic Ethiopian coffee, Ethiopian medicinal plants are needed and korarima, specialty of Ethiopia, should be used, and other medicinal plants like tena adam are also needed. If one considers about the environment of drinking coffee, the development of burning incenses such as gum olibanum or gum myrrh could also be expected.

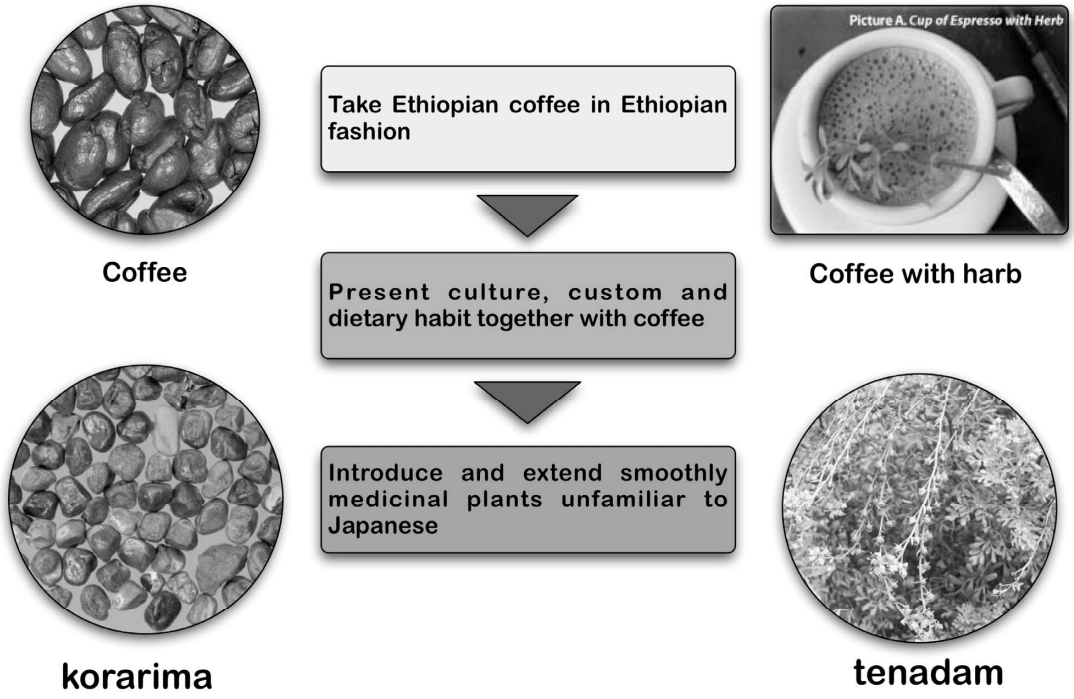


Fig. IV-2 Extension of Ethiopian medicinal plants based on coffee as a key element

In order to disseminate and establish Ethiopian medicinal plants in Japan, it would be important to utilize as the base of the campaign something that is familiar to Japanese society, in combination with the utilization of the culture and custom of Ethiopia, rather than a simple attempt to introduce specific plants.

(2) Direct import of gum olibanum to Japan

a. Consumption and import of gum olibanum in Japan

In Japan gum olibanum is imported mainly as a raw material for making incense and processed into incense and aromatics. In recent years, modern ways of use of incense are

extending, and general consumers have developed a habit of purchasing gum olibanum. The volume of import of gum olibanum in Japan remained at around 4500 kg annually according to the statistics for 2000 to 2002, with the whole sale price level at ¥ 850/kg which has remained the same in the past few years. It is said that the gum olibanum imported to Japan derives from Sudan and Ethiopia, but because it arrives via third countries, the actual condition is not determined.

Acoording to Mitsuboshi Pharmaceutical Company which sells gum olibanum in Japan, the company imports annually 1000 kg, accounting for about one fourth of the total volume of domestic distribution, and sells the commodity to domestic manufacturers as a raw material for incense articles. The said company imports it through trading firms in Singapore, and our survey revealed that the commodity that the company trades derives from Ethiopia. Consequently, about one fourth of gum olibanum distributed in Japan can be considered as products of Ethiopia.

From that finding, we proceeded to a study in which comparison is made between the gum olibanum produced in Ethiopia that we obtained during the field survey and the gum olibanum that is distributed in Japan, to determine what sort of benefit shall be realized by directly importing to Japan the gum olibanum that used to be imported through third countries.

b. Comparison between products of gum olibanum distributed in Japan and those acquired in Ethiopia

Field survey mission acquired a total of 7 commercial samples from 2 trading firms in Ethiopia. The evaluation of quality of gum olibanum by Ethiopian trading firms is made based on the criteria comprising grain size, whiteness, extent of contamination by impurities, and compound content. The products acquired included 6 samples ranging from the top quality product of "1st Grade 'A'" to the lowest one of "4th Grade 'Normal'" provided by the Company A, and one product of "Grade B", corresponding to the standard average quality by the Company B. In addition to these 7 samples, we obtained one sample that is in circulation in Japanese market, and conducted the evaluation of their quality with the cooperation of Mitsuboshi Pharmaceutical Company.

As over-all evaluation, it has been demonstrated that the products of gum olibanum that have been acquired by the field survey mission in Ethiopia and rated as "1st Grade" and "2nd Grade" are of the quality equivalent or superior to that of products in circulation in Japanese market. Moreover it has been concluded that the products which are rated within the range from "1st Grade" to "3rd Grade" are eligible for distribution in Japan, but those which are rated as "4th Grade" or below contain too much impurities and are not suited for distribution in Japan.

c. Advantage of the gum olibanum imported directly from Ethiopia to Japan

Local market prices of the samples of gum olibanum acquired by the field survey mission were, in US$ for 1000 kg of each class of products, 2450 for 1st Grade "A", 1850 for 1st Grade "B", 1750 for 2nd Grade, 1400 for 3rd Grade, 1050 for 4th Grade "Special", and 850 for 4th Grade "Normal", respectively. Since the whole sale price in Japan is ¥ 850 per kg (equivalent to about US$ 8000 per 1000 kg), even if the expenses for importing procedures are taken into account, the transaction by importing the commodity directly from Ethiopia to Japan would be more profitable in terms of prices. In addition to that aspect, the direct import has the following two points as advantages.

- Original country of production is clearly defined.
- Merchandise has better fragrance.

Regarding the direct import of gum olibanum, Japanese trading firms concerned are now studying positively the approach.

(3) Issues involved in handling the merchandise imported from Ethiopia

Although Japan imports a large number of crude drugs and medicinal plants produced in Africa, the direct transactions between producing countries and Japanese enterprises handling those crude drugs rarely take place (Table IV-1). The most important reason for the situation is the lack of information about African countries, for which enterprises tend to avoid the risks involved in direct transactions.

If a sufficient amount of reliable business information is provided to Japanese enterprises on such aspects as results of inquiries by interviews with trading firms of Ethiopia or the methods of acquisition of samples of authentic origins, it would be very likely that the contact points between Ethiopia and Japanese enterprises shall be established and new business opportunities shall emerge.

When one intends to promote the export of medicinal plants and their processed products from Ethiopia to Japan, it is essential to provide a sufficient amount of reliable information to trading firms and related organizations specialized in crude drugs, and to establish a system to support the activities in Ethiopia. Since Japan applies the standards of quality of medicinal plants used for crude drugs, in the form of Japanese Pharmacopoeia (JP), it is needed to satisfy the requirements specified in JP, when the medicinal plants produced in Ethiopia are to be commercialized in Japan. Consequently, regarding the medicinal plants used as crude drugs in Japan, it would be desirable that the growers benefit from the cooperation by Japanese trading firms from the stage of production or commercialization.

Table IV-1 Principal medicinal plants Japan imports from African countries

English names	Japanese names	Plant species of origin	Plant parts	Note
Gum arabic	Arabia gomu-noki	*Acacia senegal* Willd. and species of same genus.	Solidified resin exuded from slashed bark	Phar
Aloe	Aroe	*Aloe ferox* Mill. Or ahybrid between this species and *Aloe africana* Mill. or *Aloe spicat*a Baker	Dried material derived from juice obtained from leaves	Phar
	Aroe-bera	*Aloe vera* (L.) Burm.fil.	Mesophyll tissue	Edible
Cocoa	Kakaonoki	*Theobroma cacao* L.	Seed	
Calumba	Korombo	*Jateorhiza columba* Miers	Root	Phar
Pyrethrum	Shirobana-mushogiku	*Pyrethrum cinerarifolium* Trevir.	Flower head	
Kombe arrow poison	Sutorofantusu Kombe	*Strophanthus komb*e Oliv.	Seed	
Senna	Sen-na	*Cassia angustifolia* Vahl. *Cassia acutifolia* Delile	Leaf	Phar
Clove	Choji-noki	*Syzygium aromaticum* (L.) Merr. et L. M. Perry	Flower bud	Phar

"Phar" signifies that the species is registered in Japanese Pharmacopoeia for the use as a crude drug.

2) High profit agriculture in Ethiopia through introduction of medicinal plants of foreign origin

(1) Production of crude drugs in Ethiopia

Here, we consider high profit agriculture when medicinal plants indigenous to non-African countries are to be introduced into Ethiopia.

The whole area around Awasa city, located about 300 km to the south of capital Addis Ababa is chosen as an assumed area of development.

This area is situated 1500-2000m above see level, receiving annual precipitation of around 700mm, and lying on the alkaline soil.

In Ethiopia as a whole, it is difficult to acquire fertilizers, chemicals and agriculture materials in sufficient quantities. Besides, since one cannot expect that the chemicals locally available satisfy sufficiently the standards of safety and quality required in Japan, it is needed to explore rather the way to dispense with chemicals.

For these reasons, the requirements for candidate medicinal plants of foreign origin are the tolerance to arid and alkaline soil and characteristics allowing extensive cultural practices. Moreover, those medicinal plants which are in great demand in Japanese or global market are desirable. As candidate species satisfying these requirements, mahuang (Joint-pine, *Ephedra spp.*), liquorice (*Glycyrrhiza glabra*) and sweet wormwood（*Artemisia annua*） are considered to be promising (See Chap. 3).

Plants of genus *Ephedra* range in many parts of the world, in addition to dry climates over China and Inner Mongolia, numbering about 80 species. The dried above ground portions of mahuang are utilized as a crude drug mahuang, with remedial effects to induce sweating, alleviation of fever, antitussive activity and urination, and prescribed as an ingredient of drugs for common cold like antifebrile infusion. In the U.S.A., the extract of mahuang is sold as a supplement product.

Liquorice is a perennial leguminous plant distributed over the dry zone extending from China and Inner Mongolia to Middle East. The portion used as a crude drug is its underground parts, and it is an important one used for detoxification, diuretic effect and pain relief, contained as an ingredient in many prescriptions. The most of consumption in Japan is used as an added sweetener to soy sauce and other foods, and the demand in the West as a sweetener is also great.

(2) Necessity of the production of crude drugs, "mahuang" and "liquorice"

Japan depends on import from China for the supply of the most of mahuang and liquorice it needs. Currently in China, due to the rapid economic growth, the domestic consumption of these plants also is increasing. Moreover, the abusive collection of liquorice in the northwest of China has intensified and is deteriorating the habitat of the herb. Such plants as Mahuang and liquorice grow wild in arid zones and wastelands in China, and the production has been made exclusively by gathering native species. However, the Chinese government has started to regulate the gathering and exports of mahuang and liquorice to protect the plant resources. Under such circumstances, it is getting difficult to acquire inexpensive mahuang and liquorice of good quality that Japan used to import from China so far. Regarding liquorice, from the viewpoint of diversification of risk, a Japanese trading firm has introduced seeds or seedlings and production techniques to Australia and started to grow the plant on a commercial scale.

(3) Issues in the production of crude drugs in Ethiopia

As issues in the production of mahuang and liquorice in Ethiopia, three subjects can be taken up: “acquisition of seeds and seedling”; “development of cultural techniques”; and “conformity to standards stipulated in Japanese Pharmacopoeia.” The plant from which a crude drug is derived is stipulated in JP. Consequently, it is needed to acquire the seeds and seedlings of the kind of plant that conforms to the stipulation of JP, and to grow it. In order to grow exotic plants, it is needed to conduct research work to determine basic conditions such as suitable geographical areas for cultivation, the seasons of planting and harvesting, etc.

An essential issue is the necessity of conformity to the stipulations of JP with respect to the product form and the contents of ingredients, when the merchandise is to be marketed in Japan. In the selection of varieties, it is necessary to consider not only the advantages in growth and yield, but also other factors such as the contents of ingredients that are included in the criteria of quality stipulated by JP.

Research Center for Medicinal Plant Resources, National Institute of Biomedical Innovation preserves the seeds and seedlings of the plants origin of mahuang and liquorice, and has developed the cultural practices in Japan and published a series of booklets, “Cultivation of medicinal plants and evaluation of quality”. Regarding the two issues, acquisition of seeds and seedlings, and basic study on cultural techniques, Japan is in the position to be able to extend technical cooperation and assistance.

Regarding the production of crude drugs in Ethiopia, the ultimate success will largely depend on the cooperation by the enterprises associated with crude drugs, who are the consumers in Japan. It would be necessary in the future to exchange views with the enterprises associated with crude drugs in Japan on the matters of quality and marketing.

Chapter V Propositions on marketing
- Potentials as observed through field survey -

In the study of the high profit agriculture, an indispensable element in the grand framework of approach is the question of supply and demand. Unless the supply and demand is well balanced, the final result would be jeopardized. Consequently, it is essential to determine if the potential of demand can be expected.

Here the present writer would like to explain the concept of marketing as a common matter. Moreover, the means and method for project development shall also be presented.

1) Marketing

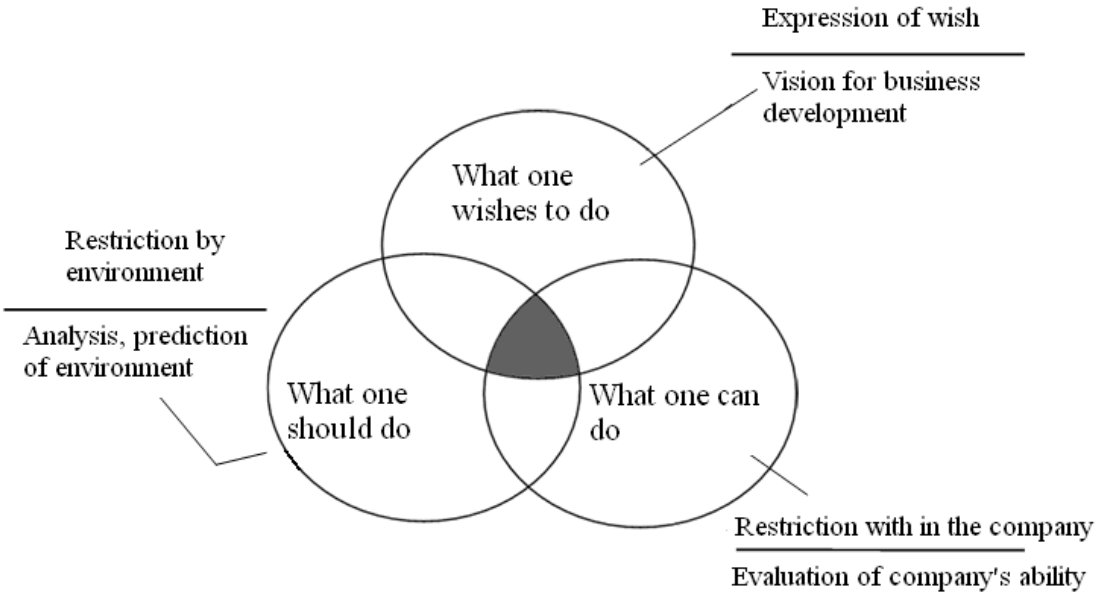
＜5 principal elements ＞

(1) To whom	・・・・・・	(Discovery, creation, identification, and management of customers)
(2)What	・・・・・・	(Products)
(3)Through what	・・・・・・	(Channel development)
(4)How to impress	・・・・・・	(Communication)
(5)How to provide	・・・・・・	(Logistics system)

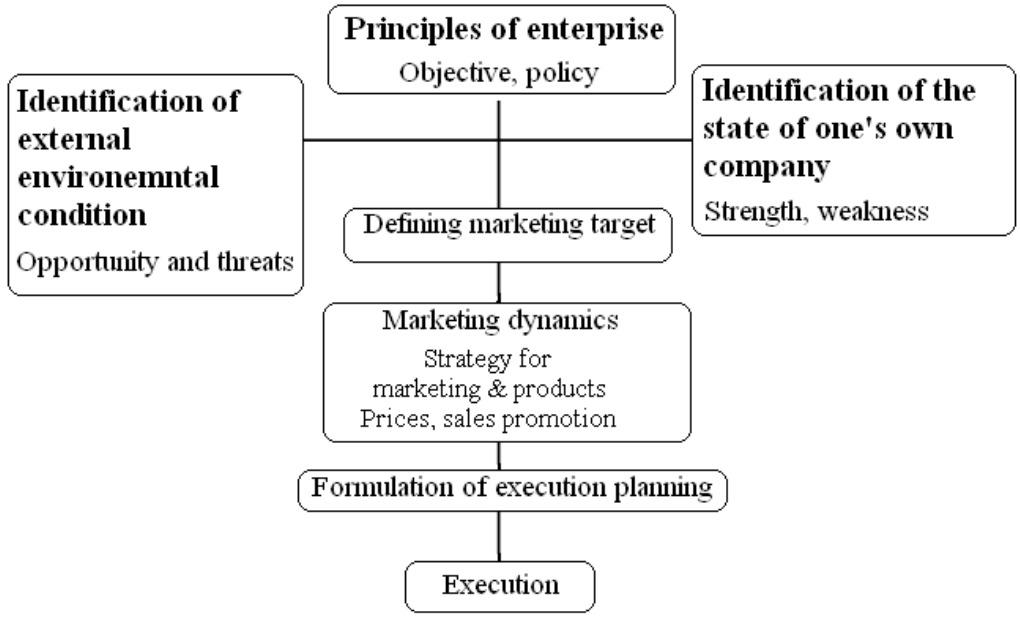
＜Procedure＞

(1) Marketing Research	Not market but marketing.
(2) Product Planning	Design, package, etc.
(3) Production Planning	Consider fabrication processes, efficiency, etc.
(4) Merchandizing	Grouping and serialization of articles
(5) Display	How to exhibit, tools for direction, POP.
(6) Zoning	Slot allocation, presence enhancement
(7) Sales Promotion	Story, concept, naming, catch copy, public relation, advertising,

1. Concept of project development



2. Procedure of project development



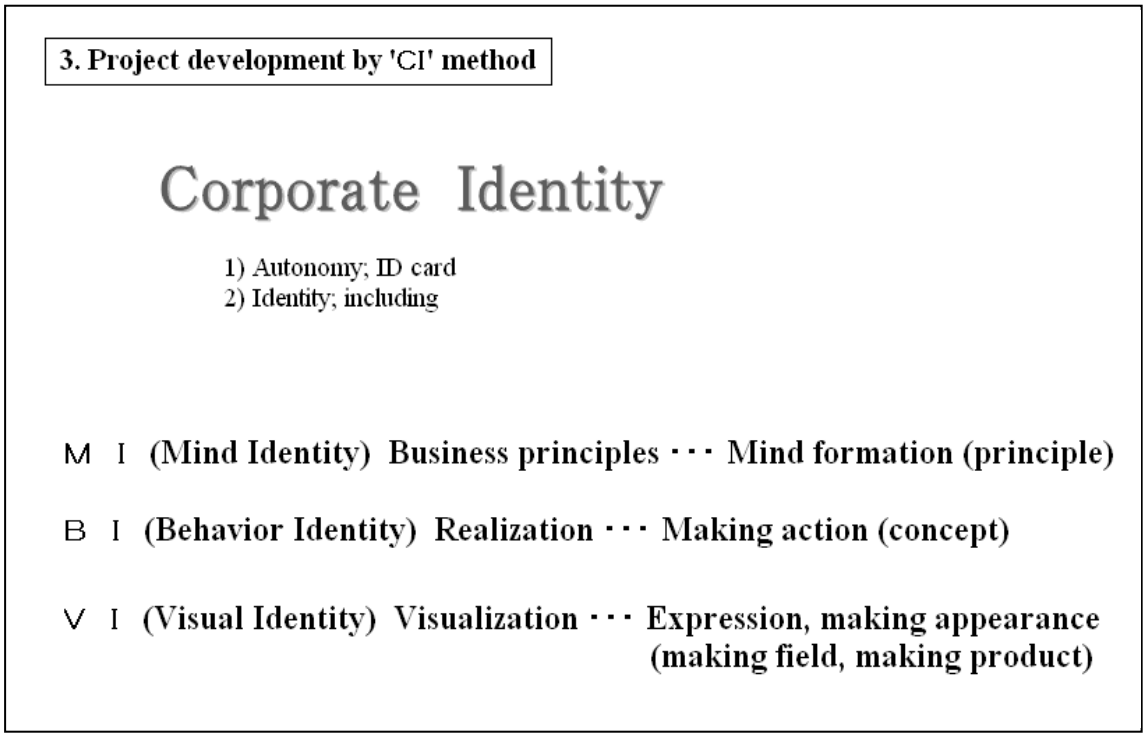


Diagram 1. visualizes the approach for undertaking a new project, firstly by extracting the overlapped parts of what one wishes to do, what one should do, and what one can do. There happens more often than not the situation that what one wishes to do predominates over the other factors, causing difficulties in actual execution.

What should be noted is the requirement of "Identification of the state of one's own company" in the diagram 2, "Procedure of project development". This concerns the analysis of strength and weakness that can be applied to all sorts of things. It is advisable that one takes inventory of one's own situation by sorting out the strong points and the weak ones. It's all the better if one simply expands the strength. As to the weakness, one can either eliminate it or transform it. The transformation requires a grand idea, and if this could be done, it surely would bring about the best result.

On the other hand, there is another method of development that is CI method. This is the one in which the concept is developed through the steps of MI, BI and VI. Thus, it is essential to finalize the decision by going step by step starting from the top, rather than starting immediately from the step VI/(Making field, making product).

2) In undertaking the project in Ethiopia

(1) Development in the subsidiary industries !

It is important to visualize the stages of industrial development in plural terms.

Many products and services are delivered to the final consumers after passing through several industrial stages. These processes are called distribution where the tertiary industry that is situated the closest to consumers and practicing retailing is called distributive trade, and generally the higher the order of industrial stages advances from the primary through the secondary to the tertiary, the higher becomes the added value realized. It is the most desirable for the business not only to operate in the primary industry but also to integrate plural stages of the secondary and the tertiary industries into the same enterprise structure.

Moreover, as the destinations of supply of medicinal plants the following markets are supposed: (i) foods, (ii) restaurants, (iii) health foods, (iv) pharmaceuticals, (v) cosmetics, (vi) spa and beauty salons, (vii) herb and aroma therapy, (viii) hobby and general merchandise, (ix) interior decoration, etc. It is desirable to engage in activities to supply products as the goods that have been transformed as much as possible to approach the finished articles, targeting and conforming to these markets. This is because the added value will surely augment by the strategy.

(2) Project development integrating 4 principal business elements

Men, object, money and information are said to be the four principal elements of business. In the domain of business, the stable success is achieved only when these elements are combined to work to the fullest extent respectively. In whatever industry at whatever stage of the industry, this is an essential condition.

Men: Performance differs greatly depending on the level of awareness of each one. It is necessary to arouse “motivation” by thorough education and guidance.

Thing: It is also necessary to conduct study and research of the market which potentially generates demand and to propose products to it.

Money: The most economical proposition and idea are desirable. It concerns so-called ingenuity and creativity.

Information: Information is the most important element. It is desirable to provide in a consistent manner the information to answer the questions: (i) Through what kind of distribution channel? (ii) In what kind of market? (iii) For what price ? (iv) What kind of competition is found there? (v) How one’s products are evaluated and accepted? In other words, the essence of the matter may be the creation of “merchants” rather than “producers”.

The above statement presents the fundamental concept of the marketing proposition for Ethiopia.

3) Proposition to Ethiopia – from the viewpoint of marketing

(1) Coffee

Coffee is reputed to have originated in Ethiopia. The best policy of business is the exploitation of strength. What about the commercialization of this commodity? It is said that there exist 60 species and varieties of coffee plants in Ethiopia. Here lies an enormous business opportunity. However, until now, for historical reasons, the commodity has been distributed only under a unified brand name of "Mocha". The proposed innovation is "branding" in which Ethiopian growers create "products" under their own brand names, instead of, as in the past, shipping out simply crude beans or at best dried and sorted beans. That strategy will enhance the added value without fail. The strategy also correlates this approach with "One-Village One-Product" movement. However, the distribution sector is a strictly disciplined entity, and particularly abhors skipping of existing distribution stages. Consequently, producers have to continue to supply the commodity also to existing channels. They increase the production and transform the surplus into products for the new channel. This will enable them to evade the deterioration of relationship with existing customers. In the meantime, they establish their own brand to try to exit from the existing distribution system which is limitlessly akin to the primary industry, and to try to venture upon the veritable secondary industry. There would emerge a new opportunity to develop into "One-Village One-Product", "One-State One-Product" and even "One-Country One-Product" perspective.

The procedures of preparation of merchandise and distribution would be as follows.

Although the ideal process up to the preparation of marketable products would be like the one on the left, this is not necessary at the moment. The flow on the right would suffice.

Increase harvest of beans
↓
Remove pulp
↓
Wash
↓
Dry
↓
Sort
↓
Roast
↓
Sort・Grading
↓
Grind
↓
Weigh ・ Pack
↓
Pack・Export

Increase harvest of beans
↓
Remove pulp
↓
Dry
↓
Sort
↓
Roast
↓
Sort・Grading
↓
Weigh ・ Pack
↓
Pack・Export

Essentials

＊Washing process requires installation. Adoption of dry process

＊Sorting under hygienic conditions, using white robe, cap, rubber gloves

＊Manual roasting

＊Conditions for sorting, grading, weighing, packaging are similar to sorting

＊Necessary machinery and equipment are as follows:

- Roaster（electric heater and motor-driven unit is desirable, but if unavailable, frying pan and charcoal will do）
- Sanitary equipment
- Weighing scale, tools .
- Package materials, desiccant, sealer.
- Lot labels, product labels
- Cartons for export

＊Others: processing plant and export traders are required

If crude beans are available, the preparation of merchandise will be completed in 3 to 4 months. The prices could be determined taking into account the cost and the results of market research. The remaining question would be to find the purchaser. In reality, this step of finding the purchaser is an important problem. However, this problem is solved easily as long as there is an enterprise willing to cooperate. It has been reported that the brand name of “Forest Coffee” has received an international certification, which has further added an advantage.

There are many stories and catch copies. “Country of origin of coffee”, “Organic forest coffee”, “Morning-picked”, “Charcoal-roasted”, “Manually roasted”, “Forest cooperative”,

etc. The rest is just the practice.

Furthermore, in Ethiopia, as described before, coffee is taken in diverse manners. Among those, there were two distinct ways of coffee consumption that are presumed to be supported by Japanese consumers. They are “tea with coffee” and the taking of coffee together with herbs. The former is an epoch-making way of enjoying both coffee and tea simultaneously. If two beverages are served in glasses in two stages that look pretty and present a feast for the eyes, they will make the most fashionable drinks. Moreover, the latter holds the possibility of blending various kinds of herbs with coffee. It is possible to use Ethiopian herbs and promote the sales in a framework of dual virtue of beauty and health.

(2) Herbs and essential oils

Japan has quite a large market for herbs and related goods used for aromatherapy. Regarding the aromatherapy using essential oils, although its history is only half as long as that using herbs, it is developing rapidly and the market scale currently stands at 79 billion yens (2005). The market of this size cannot be overlooked. Furthermore, sub-sectors deriving from this market include also cosmetics and spa/esthetic industries. Raw materials used in such industries are herbs and essential oils.

a. Herbs

Casual observation shows the existence of a large number of herbs in Ethiopia. There is a possibility to enhance the profitability of these plants by studying the feasibility of mass production of a certain number of species among them. For those species which do not exist there yet, it is worthwhile to try to cultivate them if they can be planted.

b. Essential oils

Essential oils are the products derived from herbs by extraction. The methods for extraction are diverse but the representative one is the steam distillation process. This process has a huge potential. A distillation plant was found abandoned at the Research Center for Essential Oils in Awasa. It appears that it used to be operated by French men until about 50 yeas ago to extract essential oils from eucalyptus.

In the distillation plant, we found built-in distillation equipment, 2 units of something like a furnace with capacity of 2 tons, as well as a mobile unit of distillation equipment that could be transported on a trailer to Eucalyptus farms to operate in-situ. The presence of such a facility seems to indicate that in the past a considerable quantity of essential oils used be extracted. In addition to eucalyptus, Ethiopia has many of other herbs. It is certain that the added value realized by the extraction shall be much higher than the production of herbs alone. It is an

unwise policy not to use this facility. There was no trace of destruction. It is considered that minor repairs would restore its complete function.

c. Ensete

Ensete is a valuable source of starch and used also as a staple food in Ethiopia. There is a possibility of creating business by exploiting its fibers. Actually, floor cushions and mats woven from ensete fibers are being sold. A certain private trader is trying to make a fabric consisting of 50 % of ensete fiber and 50 % of sisal fiber, which is apparently intended for making flour bags. It needs some researches to find out a suitable material to combine with ensete, but if it is processed into twisted yarn, particularly long yarn, the utilization will expand. It may be used to make interior goods naturally, but possibly may find application further in apparel products.

Incidentally, this reporter was told that ensete had insect repellant properties. If it is true and the research can demonstrate the effect and function, another big potential will emerge. As interior goods, a great many products such as curtain cloth, luncheon mats, carpets, bed covers, entrance hall mats, etc, can be developed, combining the effect and function as added value. Of course there is an alternative way of utilization by improving the present line of products of fibers as handicraft articles. If their quality is refined to the level of artifacts, the potential is great.

d. Roadside outlets of village produce

In the efforts to extend diverse technologies on project sites, in order to motivate the participating farmers, the best tactics is to let them get the taste of success.

To realize it, it is necessary to let them sell products on their own. For the purpose, why not establish a roadside outlet of village produce? It is a means to give participant farmers a place (shop).

The approach and concept are as follows:

A. As a pilot facility, construct a roadside outlet of village produce.

An area paved with concrete is needed. Rules for utilization of the facility need to be established, to prohibit the entrance of animals (cows, goats, chickens, etc) except hand carts. Animals are kept in backyards, like a car parking lot. Drainage, toilet, large washing area, garbage dump, and stage (for holding events), etc are constructed.

B. Construction of stores for participant farmers.

Shacks or a row house will do, as long as they can provide a shelter against rains and winds.

C. Let participants choose store names, feature stores with personal ideas, like playing shop by adults.

Why is it needed to construct a new one? Because changing things is difficult in existing circumstances. Modification would be difficult to make, and probably there should be someone who already has been in control of the whole situation. The new project would not proceed, due to the conflict with existing interests.

The roadside outlets thus created shall be developed in the future as follows:

These places serve as an event square. If possible, it is desirable that they would have unique features representing particular ethnic groups or regions. They shall become the places not only to exhibit local specialties but also to present the "pageantry" of respective ethnic groups and communities.

e. Other potentials

Other potentials are concisely described.

- **Honey** : This commodity has a huge potential. The remaining questions could be simply the matter of packages and stories (giving significance).
- **Bees wax** : Currently, industrialized countries are developing the candle boom. Particularly those deriving from natural substances are highly appreciated. Explore the opportunity and participate in the boom.
- **Jam** : Materials can be strawberries or mangoes or whatever's available. The process is simple, needing only to bottle.
- **Fruit sweets** : Ordinary semi-dried fruits. They can be made by sun drying. Packing is also simple.

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