Bioprospecting for Wealth and Biodiversity Conservation: Case of *Mondia Whytei* Commercialization around Kakamega Forest Ecosystem in Kenya

Mukonyi K. W.[1]* and Lwande W.[2]

[1]*Kenya Forestry Research Institute, P.O. Box 20412 -00200 Nairobi, Kenya*
[2]*International Centre of Insect Physiology and Ecology, P.O. Box 30772 – 00100, Nairobi, Kenya*
*Corresponding author. E-mail: mukonyi2000@yahoo.com

Abstract

This paper is a review of bioprospecting activities on *Mondia Whytei* Plant Species, achievements and impacts on livelihood and biodiversity Conservation in western Kenya since the project funding by African Academy of Sciences (AAS) from1998. Bioprospecting is viewed as a useful tool in protection and commercialization of indigenous knowledge for improved livelihoods and biodiversity conservation. It has been recommended that bioprospecting in developing countries should be operated on a commercial scale if it is to add value to biodiversity, make use of indigenous knowledge and also improve livelihoods of resources owners (Weiss et al 1998). Successful bioprospecting frameworks through partnerships are recommended to enhance maximum benefit, which should equitably be distributed to resource owners. Findings of AAS funded project on *Mondia Whytei* raised the value and awareness of these species as having potential for commercialization, enhancing biodiversity conservation and also improving community livelihoods (Mukonyi et al 2002). This has led to aggressive *Mondia whytei* cultivation, processing and marketing through established bioenterprises in western parts of Kenya. Community based Mondia processing has been established in Kakamega, serving various Mondia growing farmers in Kakamega forest ecosystem. In the year 2000, about 10 groups, with about 500 farmers had been reached, but in 2003, 67 youth groups, 98 women groups, 61 church group and 16 school clubs had been reached. Given dynamic nature of community structures, commercialization of research findings is being channeled through the established community based institution. Certification procedures have been put in place to ensure sustainable harvesting both from the wild and farms. The review paper shows how the results of Mondia bioprospecting is contributing to improved livelihoods of communities around Kakamega forest and as well as enhancing biodiversity conservation of Kakamega ecosystem. Findings shows for a successful commercialization of medicinal plants, there is need for funds, values addition, and market access and market structure to be in place. Therefore partnership between community (resource owners, of both knowledge and materials), private entrepreneurs and researchers in well defined framework is important to drive bioprospecting in order to realize positive impacts on livelihoods and conservation

Key Words: Bioprospecting, commercialization, Livelihoods, biodiversity Conservation, Communities

Résumé

Cet article est une revue des activités de prospection biologique de l'espèce végétale Mondia whytei, en termes d'acquis et impactes sur les conditions de subsistance des populations et la conservation biologique au Kenya occidentale, dans le cadre d'un projet financé par l'Académie Africaine des Sciences AAS, depuis 1998. La prospection biologique est perçue comme un outil très efficace dans la protection et la commercialisation des connaissances indigènes pour améliorer les conditions de vie et la conservation de la diversité biologique. On a recommandé que la prospection biologique dans les pays en voie de développement se fasse à une échelle commerciale si celle-ci sert à améliorer le bien-être des héritiers des ressources. Des options profitables de la prospection biologique à travers des partenariats sont recommandées afin de maximiser les profits qui devraient être équitablement partagés entre les propriétaires. Le projet de Mondia whytei financé par l'AAS a pu valoriser le produit et alerter sur le potentiel commercial de cette espèce végétale, son renforcement de la conservation de la biodiversité et son amélioration des niveaux de vie de la population. Ceci a conduit à une culture agressive de Mondia whytei, sa transformation et son marketing dans des bio-entreprises existantes dans la région occidentale du Kenya. La transformation artisanale de Mondia est courante à Kakamega et profite à quelques cultivateurs de Mondia établis dans l'écosystème de la forêt de Kakamega. Au cours de l'année 2000, on comptait 500 cultivateurs de Mondia réunis en 10 groupements, mais en 2003, on a dénombré 67 groupements de jeunes, 98 groupes de femmes et 61 groupements d'église et 16 clubs scolaires. Compte tenu de la dynamique naturelle des structures de la communauté, la commercialisation des acquis de recherche dans ce domaine se fait par le biais des institutions communautaires bien identifiées. Les procédures de certification ont été mises en place afin de garantir des récoltes soutenues tant au niveau de l'état sauvage qu'au niveau des champs de paysans. Cet article fait état de la façon dont les résultats sur la prospection

de Mondia contribuent à l'amélioration des conditions de vie des communautés autour de la forêt de Kakamega tout en renforçant la conservation de la biodiversité dans l'écosystème de Kakamega. Les résultats prouvent que pour une meilleure commercialisation des plantes médicinales, les fonds, la valorisation des produits, l'existence et l'accès au marché sont des facteurs indispensables. Il est donc très important d'avoir un partenariat entre la communauté (avec les héritiers de ressources tant matérielles qu'intellectuelles), des entrepreneurs privés et des chercheurs travaillant dans des structures bien définies, afin de mieux effectuer la prospection biologique qui peut avoir des impactes positifs sur le bien-être des gens et la conservation.

Mots clés: Bioprospection, commercialisation, subsistance, conservation de la biodiversité, communautés

Introduction

This paper reviews research work done on Mondia *whytei* , since initial funding by African Academy of Sciences in 1998.Results from African Academy of sciences funding on *Mondia whytei* were published in journals, Newspapers (Kenyan Daily Nation 10.17.2002,7.10.2003), presented in conferences and even transmitted on Radio and TV programs(both locally and internationally). This publicity attracted many research interest groups that received further funding on *Mondia whytei* activities in Western Kenya. Initially communities have been accessing their Mondia from the Forests but now it is being harvested from domesticated farms. Currently a lot of information has been generated on *Mondai whytei* in respect to impacts on livelihoods and conservation, which is the basis of this review. This species is an example of indigenous African herbal medicines that have been researched on and now being cultivated for commercially purposes in Africa. The success of *Mondia whytei* promotion is attributed to the existing bioprospecting framework between researchers, communities and private partnerships. Therefore the review has focused more on bioprospecting aspects on *Mondia whytei* species and its contribution to livelihood and biodiversity conservation in Western Kenya. Also related work done by various researchers has been reviewed in respect to access and equitable benefit sharing framework through bioprospecting.

Issues of access and equitable benefit sharing of biodiversity and its derived components are now major debate in many environmental meetings. Sustainable utilization of biodiversity, ownership and transfer of derived components in an acceptable manner appears to direct future of world trade (Michael A. Gollins 1993). Various scholars have proposed that best way to promote sustainable utilization of biodiversity and equitably enjoy benefit of derived components is through bioprospecting (Weiss et al 1998, Baker et al 1995). Thus it has been proposed that biodiversity conservation drive, should be treated as a business, operated through partnership between government, private and community (owners of resources) in a well-established framework. There are now many bioprospecting projects that have been designed, which are viewed as models (Weiss et al 1998). There are challenges faced in bioprospecting projects, which include, lack of appropriate legislation on access and benefit sharing and bioprospecting guidelines in most African countries. When it comes to ownership and benefit distribution to communities is complex. Sometime the resources are owned communally and no proper structures exist on distribution of benefits. Also the indigenous knowledge may be public in some societies or it has been distilled, coded and inherited within families in a particular community.

In some areas already the indigenous knowledge and derivatives have been commercialized, but in others it is still dormant and untapped. Owners of resources could also posses the related knowledge or owners of resources and knowledge are quite different entity. It has been realized owners of both resources and knowledge lack the capacity to exploit their potential. To benefit from biodiversity, utilizing owner's knowledge calls for partnership between researchers, policy makers and entrepreneurs, to appropriately develop and commercialize the underlying potential. In respect to complexities of benefit distribution in community cases, some partnerships feels that it is better to undertake promotion of social responsibility activities like building of schools and hospitals etc to the deserving communities from derived biodiversity benefits. This paper demonstrates how indigenous knowledge of *Mondia whytei* guided research leading to products development that has now been commercialized enhancing community income.

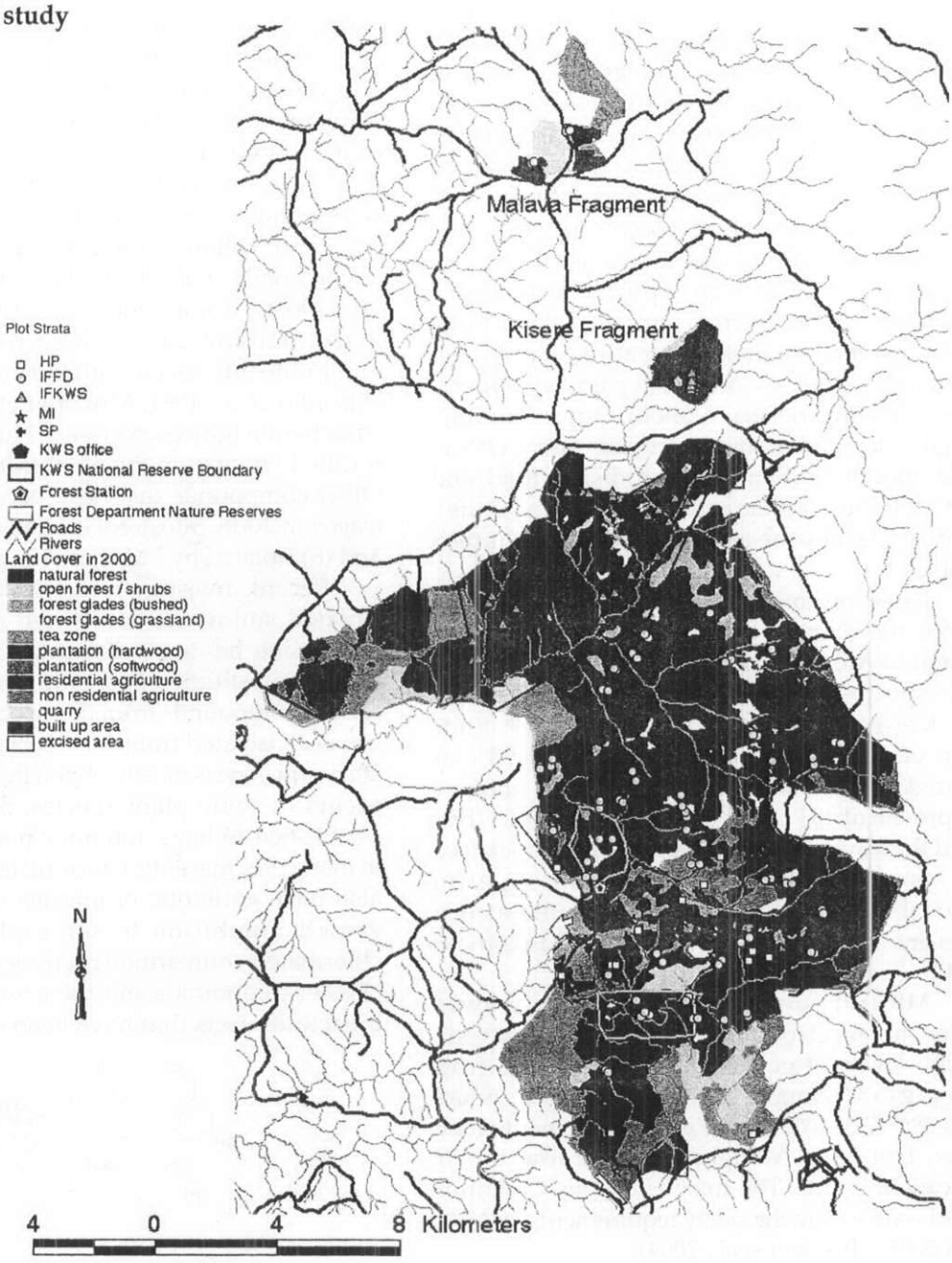
These activities were carried out in partnership with communities in the Kakamega ecosystem with more emphasis to those adjacent to Kakamega forest. A lot of data through reports, scientific presentation and publications generated from implementation of these activities do exist. Thus generated information from funded projects were reviewed with focus on community livelihoods and conservation. The

documents included those from African Academy of sciences, Macarthur foundation, Agriculture research funds (ARF) and Ford foundation funding.

Also other relevant publications on *Mondia whytei* including bioprospecting papers by various researches from different regions were reviewed.

Study methodology

Area of study



Mondia whytei bioprospecting activities were based in Kakamega, western part of Kenya

Field visits interviews observations and group discussions through communities implementing Mondia activities were undertaken and generated information analyzed for the content.

Results

Nutritional and Bioactive Component of Mondia Whytei

Detailed investigation through communities in the Kakamega forests biodiversity ecosystem revealed that they have wealth of knowledge and used *Mondia whytei* in many ways. (Mukonyi *et al.*, 1998; 2001; 2002; 2004; 2004). Also this species is extensively utilized in most parts of Africa (Koorbanally *et al.*, 2000 Thornell *et al.*, 2000). Some of the identified uses included; management of anorexia, treatment of sexually transmitted diseases, stomach ailments and impotence, in countries where it occurs in Africa. The Luhya community of western Kenya use it for; love potion, symbol of peace, sign of power, treatment of hypertension, stroke, anemia, improved sleep, body warmth, asthma, enhanced urination, hang-over, mastitis, allergies, eases after birth pain, heartburns, measles, hepatitis, rickets, typhoid, stops vomiting, meningitis, pneumonia and improved vision. Others include, mouth fresheners, aphrodisiac, food and mouth diseases, enhanced memory, appetizer, toothbrush, leaves for animal fodder and human vegetables

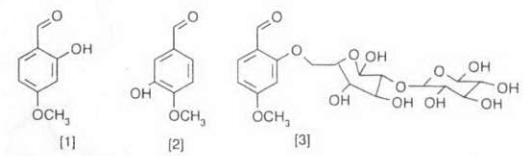
Based on this uses many researchers have validated the claimed values by the communities. Valuation of Mondia leaves and roots as potential fodder species to enhance milk production in livestock revealed the plant leaves has highest crude protein of 20.25% and ash content of 16.98% as compared to standard dairy meal which showed crude protein of 16.76 and ash content of 7.83.. This showed the leaves to have potential as livestock feed stuff. Studies showed Mondia had superior nutritional value to other feed supplements such as Rhodes grass, maize germ and Lucerne (Mukonyi et al 2004).

Mineral content determination showed variation in respect to habitats. In general plant roots had high levels of potassium which ranged from 11.34mg/g to 32.05mg/g as compared to roots which ranged from 3.08 to 8.25 mg/g. Trace elements Zinc, Copper, Iron, and Manganese were low but in significant amount. The toxic elements, Cadmium and lead were within the safety requirements of WHO (Njihia 2005; Mukonyi *et al.*, 2004).

Studies showed plant roots to have presence of vitamins, which varied with habitats. _ carotene leaves varied from 21.812 _g/g to 4.35_g/g Thiamine 3.69 mg/g to 0.77 mg/g, Riboflavin 2.45 mg/g to 0.65mg/g niacin 8.15 mg/g to 0.53 _g/g. These showed Mondia could be used to supplement some of this vitamins in food diets. The plant sample showed varied levels of the following sugars, fructose, xylose, glucose and sucrose. Young plants gave highest concentration as compared to mature sources.

Various researchers have evaluated phytochemical value of plant roots. The main flavouring principles have been identified as compound (I) –2-hydroxy-4-methoxybenzaldehyde, (Mukonyi et al 1998, 2001, 2002, Koorbanally *et al.*, 2000; Kubo *et al.*, 1999). This compound has been shown to posses taste modifying properties, (Mukonyi *et al.*, 2001), and also to have properties for insect control, (Kubo *et al.*, 1999). Compound (1) has structure similarities with the commercial compounds such as Vanillin, Asprin and salycyclic Acid from willow plant. Compound (2) –Isovanillin, (Koorbanally *et al.*, 2000, Mukonyi *et al.*, 2002, 2003, and 2004). Compound (3) –2-hydroxy-4-methoxy benzaldehyde-2-0-b gluco-pyranosyl 1-6-0-b xylopranoside, been isolated by various groups, (Msonthi *et al.*, 1991, Mukonyi et al 2001, 2002). A trisacharide (glucose:xylose 1:2 linkage was isolated for the 1st time from the plant (Mukonyi *et al.*, 2004). Other compounds that have been isolated from *M. whytei* include, Sitosterol (5) and compounds (6) (7) and (8) isolated by (Mukonyi *et al.*, 2002).

Recent investigations by Ramesh *et al.*, 2005 isolated coumarins and three coumarinolignans (9_13) one having substituted Clorine moieties. Clorine substitution and coumarinolignans are new class of compounds from this species.. Also squalene has been isolated from this species by Ramesh *et al.*, 2005. Squalene is mostly obtain in Whale oils and also occurs in some plant species. Squalene has been established to have antibiotic potential and is used in many pharmaceutical formulations. The coumarins also have antibiotic properties while others show growth inhibition to some plant species. The chlorinated coumarinolignans is an interesting new class of compounds and there were no evidence of bioactivity tests that have been carried out.



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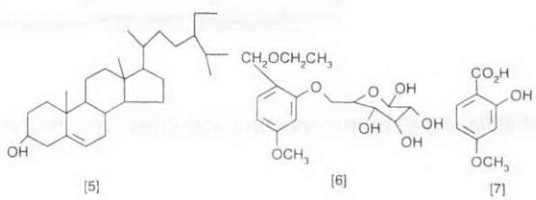

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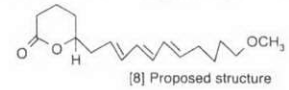
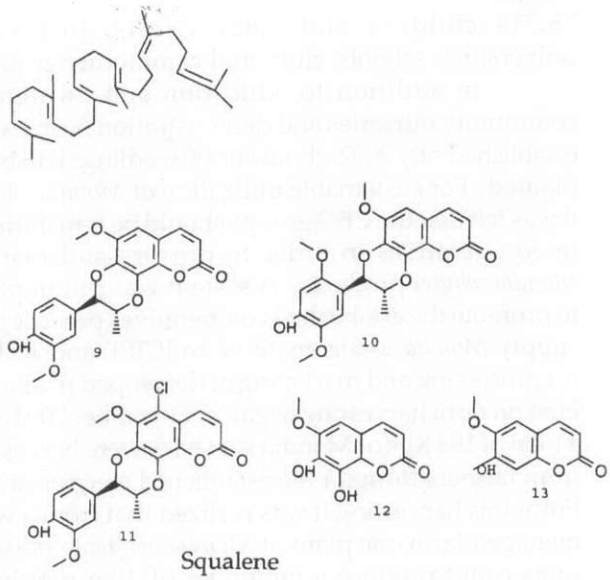
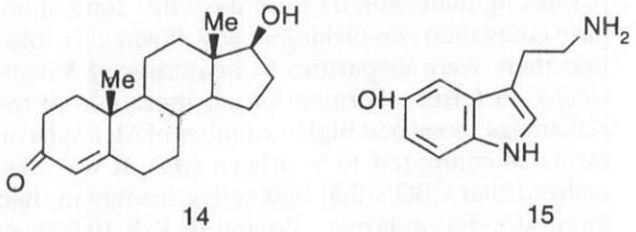


[8] Proposed structure



Squalene



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Bioassays have shown the roots extract to have antibacterial effect against *Escherichia coli, Salmonela typhii, Pseudomonas auriginosa, Bacilus subtilis, Staphylococcus aurius* and *Shigallae dysentrae.* Both roots and leaves extracts have shown anti fungal properties against *Candida albicans* and *Aspergilus niger*(Mukonyi *et al.*, 2004).

Studies revealed that root extract of *M. whytei* showed strong inhibition activities against *Neisseria gonorrhea* in comparison to Norfloxaccine (Normax) and Minoglycine. Neat root extract showed inhibition zone of 22 mm ± 0.2, Minoglycine 14 mm ± 0.3 and Norfloxaccine 35 mm ± 0.01. This showed Mondia roots extracts to be more potent than minoglycine drug in management of *Neissria gonorrhea* sexually transmitted disease (Mukonyi 1999). Pierre *et al.*, (2004) showed toxicity level of LD_{50} of 11.9g/kg for acqous extract in mice, which showed root extract have minimal toxicity levels. Androgenic studies revealed administration of *M. whytei* root extract caused an increase in serum and intratesticular testerone (14) levels, suggesting hormonal effect (Pierra *et al.*, 2004). The same group also observed an increased sperm density in cauda epidydermis of treated rats, suggesting potential in sex stimulating effects. Studies by (Mwangale *et al.*, 2000) revealed the root extract had effects similar to ferusamide drug used in kidney disease management though enhanced urination, oxytocin effect in rat, uterine contraction and bronchi dilation effect similar to asthmatic drugs. Studies by Githinji (2005) revealed the root extract causes contraction of smooth muscles and reduction in high blood pressure. Also Githinji (2004) studies revealed the root extract exhibit seroternigic properties for –5-HT-agonistic effect. This indicate the roots extract may have effect on brain and muscular functioning and also enhance sleeping properties. Lack of seroternergic effect causes brain and muscular dearrangements. Serotonin (15) has been shown to control appetite, sleep memory, sexual behaviours and depression. The market for seretonin agonistic drugs is believed to be global US dollar 10 billion markets, value that is growing.

Efforts Towards on Farm, Cultivation of Mondia Whyte,I around Kakamega Forest.

Studies on nutritional and bioactive ingredients of *M. whytei* roots revealed the plants economic potential. The results confirmed the communities' indigenous knowledge on its use. ICIPE and Kenya Forestry Research Institute signed a memorandum of understanding to promote utilization of the species through communities in Kakamega forest ecosystem in support of conservation. In 2000, through Marcurthur funding through ICIPE, various community based groups adjacent to Kakamega forests and its outliners, namely Malava, Bunyala and Kisero blocks were trained on importance of *Mondia whytei*, its cultivation, harvesting and management. About 500 individuals were reached. Table (1) showing groups reached in 2000(ICIPE report 2004).

Table1: Community groups reached in 2000.

Community groups	Northern Kakamega forest site	Southern Kakamega forest site
Kakamega environmental education group (KEEP)	X	X
Muliro farmers conservation group (MFCG)		X
Malava community based distributors women group	X	
Shamakhubu community based distributors women group		X
Shikusa community based distributors women group	X	
Kakamega forest community based distributors women group		X
Kambiri community based distributors women group	X	
Ileho community based distributors women groups		X
Sabatia community based distributors women groups		X
Shiru community based distributors women groups		X
Mang'uliro community group	X	
Virhembe youth development group		X
Ikuywa community based group		X

From 2001 to 2003, various groups were reached in addition to the earlier identified. The table (2) indicates categories of groups that were reached, between 2001 to 2003.

Table 2: Number of individuals/Groups reached from 2001- 2003

Categories of groups	**Number trained**		
	2003	2002	2001
Community youth groups	67	62	28
Women groups	98	93	68
Church groups	61	42	21
School clubs	16	-	-

Most of those planted in 2000, 2001 and 2002, were initiated through ICIPE/KEFRI Marcuthur funding, and KEFRI/ ICIPE/KARI-ARF funding mostly for 2001/2002.

The initial programme targeted specific self-help groups (Table 1), but current survey showed various groups now interested in Mondia domestication. KEEP took an active role in education and awareness creation and between 2001 and 2003 they had taught 25,714 children and 3,827 adults, including universities, schools, clubs and community groups.

In addition to education and awareness community nurseries and demonstration farms were established. By 2002, about 40,000 seedlings had been planted. For sustainable utilization of *Mondia whytei* it was felt that the CBO groups should be transformed in co-operatives in order to procure and market *Mondia whytei* products. A system was put in place to promote the established co-operatives procure and supply *Mondia whytei* material to ICIPE and KEFRI for processing and marketing of developed products. First on farm harvesting began in December 2003 and a total of 193 Kgs of Mondia root bark were harvested from farmers through the established co-operatives. From this harvesting it was realized that from a well managed farm one plant of *Mondia whytei* harvested roots could produce a minimum of 3 kg root bark after three years.

During same period an assessment was undertaken to establish impact of planting and harvesting from the wild. The study revealed (Laurine 2003), that most of the dealers were still harvesting their Mondia from the wild. Rate of on-farm cultivation was picking slowly. It was also noted that there were disparities in quantities of *Mondia whytei* on farms. Farmers on northern site of the Kakamega forest had higher number of *M. whytei* on farms as compared to Southern site. It was also realized that CBO's that had active leadership had more Mondia on-farms. Pricing of Ksh 100/kg of fresh root bark appeared to have discouraged farmers for it was realized Mondia root harvesting was labour intensive, which involved digging, washing and immediate peeling to avoid quality deterioration. Farmers also indicated on-farm management of *M. whytei* was costly since they required either poles or wires for support. It was also realized that few of the dealers and herbalists had established *Mondia whytei* plantations. On evaluation it was realized that most of the groups domesticated *Mondia whytei* as a source of income. Therefore any boost to income would increase domestication leading to conservation of the species. Therefore need to demonstrate differences in benefits between cultivated and those cultivated in the wild. Success of the projects depended on its ability to bring income to the community. Lack of institutional or economic support has been identified as a failer affecting most medicinal cultivation in the world. Cunningham (1997) reported that regardless of cultivation programmes in South Africa being in place for over 50 years they have not succeeded due to: -

- Lack of institutional support for production and dissemination of key species for cultivation.

- Low prices paid for traditional medicinal plants by herbal traders and urban herbalists.

Therefore challenges faced were on establishing appropriate operational community institutional for exploitation of *M. whytei* and improving pricing. The assessment results showed most farmers had acquired knowledge on sourcing of seeds/ propagation materials, establish and management of nurseries, on-farm cultivation and sustainable harvesting.

M. Whytei Community Based Processing Unit in Kakamega

In 2005, ICIPE through Ford Foundation funding acquired processing premises for KEEP, one of CBO in Kakamega town. This group was identified based on its wider coverage in Kakamega ecosystem and also it was well established. A system was put in place, through KEEP to link up with farmers, promote on cultivation, procure and processing *M. whytei* in collaboration with ICIPE and KEFRI. KEEP were registered as a CBO and now being transformed into a trustee to fully manage business transaction of *Mondia whytei* in Kakamega.. . The capacities of the KEEP CBO through Ford foundation funding were enhanced to undertake *Mondia whytei* sustainable exploitation. Aplot was acquired for the CBO where a processing unit has been build t through a revolving loan managed by trustees, namely the project partners ICIPE, KEFRI and KWS.

Currently KEEP is undergoing restructuring, where it has formed a co-operative as a business or income-generating arm of the CBO. The co-operative has a manager, who oversees extension staff. KEEP is currently undertaking aggressive campaign on education and awareness on promotion of *Mondia whytei* cultivation in Western Kenya. At same time they are continuously being trained to ensure sustainability and high quality delivery of *Mondia whytei* products. KEEP management and extension staff have been taught on good farming, harvesting and manufacturing standards. *Mondia* roots collection from sources is well monitored, labeled and delivered to the factory. Each batch is semi-processed then well labeled packaged and send to ICIPE/KEFRI for further product development. This system has now ensured continuous flow of Mondia products from farms and more farmers are now planting.

Marketing of Mondia Whytei Products

Success of any product on the market requires competent entrepreneurship skills. This requires an understanding of the full process of product development, which include at farm level, processing and to market. Understanding of ful process enables better marketing and sustaining product trade at optimum profit levels depending on prevailing markets. Marketing of new localized products for acceptability at wider market requires more time, finances and its also risk. Therefore putting in place proper strategies and selection of suitable markets is more advantageous, especially targeting first the host group. This means all the stakeholders in the market should be knowledgeable of the prevailing situations to sustain the activities.

Main actors in *Mondia whytei* products include the producers (farmers), industry (products), entrepreneurs and the consumers. The farmers were taught on how to source quality Mondia seeds, best agricultural practices, including suitable harvesting and post-harvest handling techniques. They were also informed on pricing from planting, production of raw material to final products. Therefore based on their input they could bargain for the prices through their co-operatives societies. During processing conditions are checked for high quality product. High quality packaging material was established with the help of a competent designer firm. The designer firm enabled production of high quality user-friendly labels, indicating product type, uses and how to apply. The designs were taken to a good manufacturing firm to produce high quality packaging material. The packaging material and Mondia powder are packaged by a competent firm that seals the product ready for market. Initially Mondia products were being sold as fresh dried roots, or ground root bark in a polythene paper which had a low customer appeal. After packaging the main challenge was marketing or introducing the new product. Free tins were given to community members in western Kenya, showing them the new product. Other tins were advertised through exhibitions, seminars, meetings and conferences. Others through the projects activities in the media. Also samples were distributed in selected shops, feedbacks were evaluated through questionnaires and personal interviews on product preference and packaging. The comments were used to improve on marketing strategy and product packaging. After the awareness, a request was made to market the product through leading supermarkets like Uchumi and Nakumatt, who accepted. The old customers were introduced to Uchumi. These customers introduced others, and with peoples excitement of seeing Mondia root now packaged and being sold in supermarkets, increased product demand. One thousand two hundred tins have been sold through supermarkets. Currently the demand is about 500 kg per week which translate to ten thousand tins of 50 gms each. One fact for this demand is due to high quality packaging being

marketed through leading supermarkets in the country and the product has been scientifically tested, bearing label of leading scientific institutions, KEFRI, ICIPE, KARI and KWS. This demand has led to farmers price adjustment where they are to get better pay and therefore increasing plant cultivation in western Kenya.

Issues of Access Ownership and Benefit Sharing of Mondia Whytei

The project has demonstrated how the indigenous knowledge guided research into value of *Mondia whytei* products. The results of the research have been and are being transferred to the community through the established KEEP CBO. Given that funding for research is expensive and could not be afforded by the community, researchers through partner institutions sourced for funds, which were used to add value to the indigenous knowledge.

It was realized that some of Mondia uses are in public domain. Like use of the plant as an aphrodisiac is common knowledge in most parts of Africa. Therefore a product could not be patented on Mondia based on this local use. Also given the cost of patent part of the research findings were published in journals and presented in conferences as defence mechanisms against biopiracy. A processing technology for extraction of the flavouring principle from *Mondia whytei* has been submitted by KEFRI to KIPI for possibility of patenting. Currently Mondia tonic has been developed based on KEFRI's research findings packaged and is being sold in supermarkets. The Mondia tonic, trademark has been forwarded for registration in Kenya Industrial property rights KIPI, owned jointly between communities in Kakamega through KEEP and other research institutions, that is KEFRI, ICIPE, KWS and KARI. The trademark is for marketing of Mondia tonic. There are discussions on equitable benefit sharing framework, which will support livelihoods, conservation and research from sale proceeds of developed Mondia products. Already the community are benefiting direct from sale of Mondia products, such as seeds and roots harvested from their farms.

Programmes are being put in place for germplasm collection. Currently the source of most *Mondia whytei* being planted around Kakamega forest and in Kenya came from a single plant in one farmers farm in Naitiri in Bungoma. There is need to diversify the genetic source of the material.

Farmers have recognized about 3 types of Mondia roots quality which are still being explored. Commercial Mondia roots are obtained from two sources, namely wild and on individual farms. Those in the wild are owned by Kenya Wildlife Services and Forest Department. Communities have to get licence to harvest the roots from the forest. Certification procedures are being put in place to establish sustainable harvesting. KEEP CBO is to sign on agreement with both KWS and FD on access of to the forest to harvest Mondia roots. Already *Mondia whytei* availability in the two forest blocks has been mapped. It is hopped allowing community to access Mondia roots from the forests will be an incentive to them to feel sense of seeing the forest as part of them.

Conclusion

Bioprospecting on *Mondia whytei*, may not have been structured in the best way from beginning but is shows how, researchers, private entrepreneurs can work together with communities (owners of resources both knowledge and material for benefit of their resources). The value of partnership is being seen as KEEP CBO has been established as a community based marketing channel of *Mondia whytei*. Currently communities are actively domesticating Mondia on-farms, because they have a link to market, therefore livelihoods. Researchers are actively adding value on *Mondia whytei* using the provided indigenous knowledge. The developed products will be commercialized through KEEP Mondia enterprise through established bioprospecting framework. This will lead to high domestication, reduced dependence on the forest and enhanced income to the community.

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