Medicinal uses of *Berberis holstii* Engl. (Berberidaceae) in Malawi, the only African endemic barberry

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**INTRODUCTION**

*Berberis* species, also known as barberries, are medicinally important and are used for various purposes (Srivastava et al., 2006). Although in Europe they are mostly used as ornamentals, they are used for medicinal purposes in many parts of the world. Barberries are sometimes used for preparing jams and dyes (Heywood and Chant, 1982). *Berberis* species have therapeutic properties because of different alkaloids they contain. These alkaloids include berberine, oxyacanthine, berbamine and palmatine (Lauk et al., 2007). There are about 500 species of *Berberis* worldwide (Whittemore, 1997). Two species are present in Africa; *Berberis vulgaris*, naturally present in north-west Africa, but with a wider natural distribution in central and southern Europe and western Asia, and *Berberis holstii*, endemic to the mountains of eastern and southern Africa. Specifically, *B. holstii* is distributed in seven countries: Ethiopia, Somalia, Kenya, Uganda, Tanzania, Zambia and Malawi. Within Malawi it has only been recorded on the Nyika Plateau in Nyika National Park. The only published data on the uses of *B. holstii* Engl. (Berberidaceae) are those given earlier...
with focus on Tanzania (Hedberg et al., 1982), East Africa (Kokwaro, 1993), and Ethiopia (Bekеле-Tesemma et al., 1993) respectively. The decoction of the roots is used in the treatment of jaundice (Hedberg et al., 1982) while and decoction of *B. holstii* root is used to cure stomach and abdomen pains; while external application of powdered root bark is used to heal wounds (Kokwaro, 1993). Bekеле-Tesemma et al. (1993) stated the use of *B. holstii* for hedges and firewood. However, for Malawi, roots are also reported to be used medicinally but the exact uses have not been documented (Burrows and Willis, 2005).

There is a general impression by people working in Nyika National Park that *B. holstii* is on high demand. The Department of National Parks and Wildlife (DNPW) used to issue permits to collect *B. holstii*, but the practice was discontinued in 2001 due to the escalating demand. However, people collect *B. holstii* illegally. Even though this is the case, the precise uses of *B. holstii* have not been documented. The objective of present study was to investigate the reasons for the high demand of *B. holstii*. In addition, special attention was given to document the uses and associated utilisation practices.

**MATERIALS AND METHODS**

**Study area**

The study took place in Nyika National Park, northern Malawi (10°15’-10°50’ S and 33°35’-34°05’ E). Nyika National Park covers an area of 3,200 with 80 km² being in Zambia (Downslett-Lemaire et al., 2002). The park comprises a mountain plateau, hills and escarpments (Department of National Parks and Wildlife, 2004), rolling grassland and montane evergreen forest patches (Brass, 1954; Downslett-Lemaire, 1985; Johnson, 1994; Department of National Parks and Wildlife, 2004). Malawi’s Nyika National Park is surrounded by Chitipa, Karonga and Rumphi Districts (Department of National Parks and Wildlife, 2004). The present study focused on Malawi’s Nyika National Park. The park is located at an altitudinal range of 600 m to 2607 m (Department of National Parks and Wildlife, 2004) and comprises a plateau which accounts for 1320 km². Biologically, Nyika National Park is important because it has a broad range of habitats (Johnson, 1994) and is one of Africa’s centres of plant diversity (Southern Africa Botanical Network, 2000; Burrows and Willis, 2005). In an attempt to ensure sufficient conservation of biological resources within the park, in 1978, the government relocated the people living in it.

**Data collection**

Participatory rapid appraisal (PRA) comprising four focus group discussion (FGD) sessions, and 25 in depth interviews (IDIs) were conducted in July 2004. Three localities surrounding Nyika National Park were visited. These localities were: Therere (in the District of Chitipa), Njalyanhundla (Karonga District) and Ntchenachena (Rumphi District). The districts were purposively selected because they surround the park and consequently, most people that were relocated from the park settled there. Chilinda camp, inside Nyika National Park, was also chosen because it is the only place in the park that is currently inhabited (Figure 1). Inhabitants are Department of National Parks and Wildlife and Nyika Safari Company employees, as well as the transient tourists.

The interviewees were selected through a snowballing technique (Magnani et al., 2005, Sullivan et al., 2001). All the interviews were recorded using a Sony micro-cassette recorder. The recorded information was transcribed afterwards and themes extracted. Questionnaire interviews were also employed to ensure thorough documentation of the issues (Narayanasamy et al., 2001). Prior to the interviews, the questionnaire was pre-tested to remove ambiguities (Drennan, 2003). Due to time and financial constraints, only areas that were within easy reach were visited during the main survey. To maximise the number of interviewees, any person we came across in each area was interviewed. Tape recorders were used to record each interview.

The data was analysed employing SPSS 15.0 for Windows. Frequencies were derived for all variables. Data on socio-economic variables (age, sex, employment and education) was cross-tabulated with knowledge and use of *B. holstii*. Pearson Chi-square statistics was used to assess the association between the variables (SPSS Inc., 2006).

**RESULTS**

**Knowledge surrounding utilization of *B. holstii***

*B. holstii* was known to 53% of respondents, with 43% of those knowledgeable having learnt about the plant from their parents, 28% from friends and 17% from other relatives (Figure 2). In contrast, the information gathered from PRA gave a different picture. Traditional medical practitioners (TMPs) mentioned that they knew about *B. holstii* from their ancestors, who told them about the plant through dreams.

Irrespective of source, knowledge of *B. holstii* was not significantly associated with the respondents’ age and sex, but was significantly associated with their level of education and employment status (2-tailed \( \chi^2 = 6.215, 0.955, 9.268, 17.706; df = 9, 3, 9, 24; p = 0.102, 0.374, 0.055, 0.024, \) respectively).

**People’s perception of *B. holstii***

The PRA findings showed that *B. holstii* is considered an important plant species. It was ranked as number 1 priority species in all focus group discussions. This suggested that the species has been important for a long time. People ascribe this importance to its effectiveness when used in isolation. When mixed with other plants (e.g., *Cassia abbreviata* and *Rhamnus prinoides*), *B. holstii* is still the main component of the mixture.

The questionnaire interviews also revealed the high incidence of use of *B. holstii*. About 74% of those who knew about it had used it. Of the 26% of respondents who had never used *B. holstii*, the most common reasons given were religious beliefs that ban the use of traditional medicine and difficulties in accessing the plant. In the case of those that had used *B. holstii*, there was no association between socio-economic status of the respondent (age, sex, education and employment) and
Figure 1. Sites where participatory rapid appraisal sessions were undertaken in Nyika National Park.

usage (2-tailed $\chi^2 = 12.804, 5.415, 11.774, 33.776; df = 9, 3, 12, 24; p = 0.172, 0.144, 0.464, 0.089, respectively). Both PRA and questionnaire interviews showed that the plant is used more often by men than by women.

Uses of *B. holstii*

A total of 35 medicinal uses were recorded (Figure 3 and Table 1). Cough ranked by far the highest (mentioned by over 40% of the respondents) followed by malaria, stomach ache and sexually transmitted infections (STIs) (Figure 3). Other conditions mentioned (excluded from Figure 3) were asthma, backache, hematuria, menorrhagia, body pains and sore throat (0.8% each).

Preparation and application methods

The root was the most commonly used part of the plant (reported by about 90% of the respondents). About 80% of the respondents said they know of other people who used roots too (Figure 4). However, 84% of respondents said *B. holstii* was prepared as a root infusion and the rest said it is consumed raw. The infusion was prepared by either soaking or boiling the roots. The infusion was either drunk, poured/rubbed over the body or added to porridge. With the exception of one respondent, all the others (29) said there were no associated side effects. The side effect mentioned was possible miscarriage and even death as a consequence of using the plant while pregnant.

DISCUSSION

Knowledge, attitude and practice surrounding utilisation of *B. holstii*

The results of the present study demonstrated excessive demand of *B. holstii* in the study area. It was also observed that, despite the plant being restricted to Nyika,
its demand extended to areas located far away, such as Lilongwe and Blantyre (380 and 580 km, respectively). It was interesting to notice that relocation of people in 1978 did not affect the appreciation and use of *B. holstii*. It appears that, faced with lack of alternative resources, people’s awareness of the importance of park resources increased. The understanding about the use of medicinal plants and indigenous traditional acquaintance seemed to

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**Figure 2.** Sources of knowledge about the utilization of *B. holstii*.

**Figure 3.** Most commonly reported uses of *B. holstii*.
Figure 4. Parts used in preparation of *B. holstii*. Filled bars represent parts used by respondents. White bars are parts that respondents have heard are used by other people.

Table 1. Other medicinal uses of *B. holstii*.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abortion</td>
<td>0.8547</td>
</tr>
<tr>
<td>Asthma</td>
<td>0.7692</td>
</tr>
<tr>
<td>Backache</td>
<td>0.7692</td>
</tr>
<tr>
<td>Bilharzia</td>
<td>0.8547</td>
</tr>
<tr>
<td>Bloody urine</td>
<td>0.7692</td>
</tr>
<tr>
<td>Body cleansing for prostitutes</td>
<td>0.8547</td>
</tr>
<tr>
<td>Body pains</td>
<td>1.62</td>
</tr>
<tr>
<td>Boil</td>
<td>0.8547</td>
</tr>
<tr>
<td>Ceaseless menstruation</td>
<td>0.7692</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>0.8547</td>
</tr>
<tr>
<td>Fever</td>
<td>2.47</td>
</tr>
<tr>
<td>Headache</td>
<td>3.33</td>
</tr>
<tr>
<td>Induce labour</td>
<td>2.5641</td>
</tr>
<tr>
<td>Induce pregnancy</td>
<td>1.7094</td>
</tr>
<tr>
<td>Infertility</td>
<td>0.8547</td>
</tr>
<tr>
<td>Influenza</td>
<td>0.8547</td>
</tr>
<tr>
<td>Mental disturbance</td>
<td>1.7094</td>
</tr>
<tr>
<td>Puberty in boys</td>
<td>0.8547</td>
</tr>
<tr>
<td>Rheumatism</td>
<td>0.8547</td>
</tr>
<tr>
<td>Safe child delivery</td>
<td>0.8547</td>
</tr>
<tr>
<td>Sex reversal</td>
<td>0.8547</td>
</tr>
<tr>
<td>Snake bites</td>
<td>1.7094</td>
</tr>
<tr>
<td>Sore throat</td>
<td>0.7692</td>
</tr>
<tr>
<td>Sunken Fontanelle</td>
<td>1.7094</td>
</tr>
<tr>
<td>Withdrawn behaviour</td>
<td>0.8547</td>
</tr>
<tr>
<td>Yellow fever</td>
<td>2.48</td>
</tr>
</tbody>
</table>
continue and it passed on to the next generations. B. holstii use provided an example of people trusting their alternative sources of medicine and the information propagated reaching beyond the boundaries and distances (Kokwaro, 1995; Van Der Geest, 1997). Traditional healers, on the other hand, guard this information more jealously.

The results of the present study revealed that over 70% of the people are aware of the existence and recognition of B. holstii and they practically used it for the cure of some ailments. Most likely, this popularity is due to its many reputed uses and properties. In a country like Malawi, where healthcare facilities are not only insufficient but also inaccessible, the use of medicinal plants and traditional remedies are part of primary healthcare (McCoy et al., 2005).

During present study 34 medicinal uses of B. holstii were recorded. Among these uses cough, malaria, stomachache, sexually transmitted infections and pneumonia were the most commonly mentioned uses. These uses account for the high demand of B. holstii. Although no pharmacological studies of B. holstii have been conducted, the fact that some of the medicinal uses are similar to those of other Berberis species suggests that it may contain similar properties. For example, in the case of the topmost mentioned ailments, the following Berberis species have been confirmed to have the required properties:

(i) Cough: B. lyceum has properties that suppress cough (Asif et al., 2007).
(ii) Malaria: B. erectica has antimalarial properties (Fokialakis et al., 2007).
(iii) Stomachache: B. aristata and B. lyceum have properties for treating acute dysentery (Asif et al., 2007; Sack and Froehlich, 1982).
(iv) Sexually transmitted infections: B. heterophylla, B. aetnensis and B. sibirica have antifungal activity against Candida species which is responsible for genital tract infections (Freile et al., 2003; Iauk et al., 2007; Istatkova et al., 2007; Levine et al., 1998; Wawer et al., 1999).
(v) Pneumonia: B. aristata, B. asiatica, B. chitria and B. lycium have antimicrobial activity against Streptococcus pneumoniae, the main cause of pneumonia (Heffelfinger et al., 2000; Ruiz-González et al., 1999; Singh et al., 2007).

Hedberg et al. (1982) and Kokwaro (1993) reported that roots are used in Tanzania and Kenya, respectively, and the utilization of B. holstii roots was extended up to Malawi (Burrows and Willis, 2005). The use of leaves and stem bark is reported for the first time in present communication.

The high demand and utilization of roots has potential conservation consequences. If the medicinal properties of the plant are real and these properties are present in different plant organs, diversification of organ use may allow a more efficient use of the plant. For example, cautious use of leaves (which are produced continuously throughout the growing season) could prolong the use of individual plants considerably.

Conclusion

This study has documented medicinal uses which people report to use. Given the variety of ailments that B. holstii is reputed to cure or palliate, it would be beneficial to investigate these claims from a pharmacological point of view. Considering the detrimental effects that use of roots has on the survival of the plant, it would be desirable to investigate if properties that exist in roots are also present in aerial parts.

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