

ब्र्.वय:र्ट.वयात्राक्ताः क्रांच्या

ROYAL GOVERNMENT OF BHUTAN Ministry of Agriculture and Forests Tashighhadzong

Tashichhodzong Thimphu:Bhutan



Edible Wild Plants of Bhutan and their Contribution to Food and Nutrition Security

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Presentation Outline

Background

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Conclusion

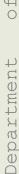
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- Topography: Small, landlocked & mountainous country.
- Elevation: 100 m asl-7500 masl
- Landform: Southern Foothills, Inner
 & Higher Himalayas
- Population: 672, 425 (69.1% in rural and 30.9% in urban)
- Agriculture as the dominant employment & livelihood source.
- Major goal of Agriculture Ministry: "Poverty Alleviation through R&D in agriculture & through sustainable utilization & management of natural resources"







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- Wide range of edible wild plants (EWP) exists & our people used to collect and consume it.
- Wild collection & consumption contributed greatly to the food & nutritional well-being of rural people
 - Provided essential nutrients for body growth & development, & for prevention of diseases associated with nutritional deficiencies.
- Traditionally, rural farmers made efforts to preserve these plants around their homes, fields & communal lands.
- Some EWPs consumed as delicacies & they played an important role in Bhutanese diet.
- Over the past decade, government's drive towards commercialization & use of high yielding varieties started eroding the traditional utilization of EWP.





- The diversity, availability, usage & traditional knowledge of EWP are declining because of cultivation of introduced crops, habitat change, rapid dietary changes, etc.
- Growing ignorance among young people about the existence of these nutritionally rich food plants.
- Further exacerbated by lack of major research & extension efforts to improve their husbandry & promote EWP species.
- Under-nutrition and malnutrition are widely prevalent in Bhutan & more acute in rural areas
- Such decline in the use of EWP by rural people could attribute to increased incidence of nutritional deficiency disorders & diseases.



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- Concern that the importation & increased cultivation of improved vegetables may reduce the collection & dietary use of EWP and more critically may replace EWP species.
- Feared that reduction in consumption of EWP would result in nutrition related disorders in the rural areas & decrease in sustainable forest usage, consequently, disruption of the coexistence of people & forest & loss of TK in near future.
- The information generated will be used as a reference material for research & development, and thus contributes to the sustainable development & conservation of natural resources in Bhutan.



Objectives



- To investigate the diversity of edible wild plants of Bhutan and their significant and future potentials.
- To find out the availability, distribution and usage of EWPs & also to take stock of the indigenous knowledge about the effect of EWPs on human health.
- To find out the most common edible wild plants and their utilization purposes.



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- The study consisted of several farm, research centres & market survey through interview with salesmen/women, researchers & residents followed by species identification.
- The 1st survey in April 2005 followed by an annual survey in different parts of Bhutan until May 2009; 18 out of 20 Dzongkhags in Bhutan were covered.
- Investigations took place five times & each investigation took about 2 weeks study in the field.
- Survey carried out by Bhutanese researchers from the MoAF & Japanese researchers from Shinshu University.





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Survey	Investigation Area
1st - April,	Western & West-central Dzongkhags (Thimphu,
2005	Punakha, Tsirang & Haa) – Market & Farm
2 nd - April,	Eastern & East-central Dzongkhags (Trongsa,
2006	Bumthang, Zhemgang, Mongar & Trashigang) –
	Market, Farm, Research & Forest
3 rd - July,	Western & West-central Dzongkhags (Haa,
2007	Thimphu, Punakha & Wangdue) – Market, Farm,
	Forest & Research
4 th - October,	Western & West-central Dzongkhags (Chukha,
2008	Dagana, Gasa & Punakha) – Market & Farm –
	Market, Farm & Research
5 th - May,	Western & Eastern Dzongkhags (Lhuntse,
2009	Trashiyangtse, S/Jongkhar, Pemagatshel, Paro &
	Thimphu) – Market & Farm





Farm / Forest / Research Survey

Market Survey

Identification



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Farm / Forest / Research Centre Survey

- Interviewed farmers / researchers on local name, edible parts, cooking & eating methods, their knowledge about its effect on health, collection source, availability season & approximate price if sold.
- Where ever possible, elderly people were selected for the interview.
- Interview followed by field observation & identification of available specimens
- Samples collected for further identification & collection (Gene-bank of National Biodiversity Centre, Bhutan.





Market Survey

- Listed & characterized all the edible wild plants on sale in the vegetable market.
- Interviewed salesperson on local name, edible parts, how to cook and eat, their knowledge about its effect on health, source from where it is collected / brought, season when it is available for collection / sale & the approximate av. price in the market.
- Collected plant samples for further identification and collection (Gene bank of National Biodiversity Centre, Bhutan





- In April 2005, a total of 98 edible wild plants, including 30 wild & 68 domesticated.
 - Wild plant species (21 families) & domesticated plant species (28 families), together belonged to 40 families.
- Pogostemon amaranthoides (Namna), Phytolocca acinosa
 Roxb. (Tashi gangkha), Thlaspi arvense (Gekha) & Elatostema
 lineolatum Wight (Damroo) leaf vegetables, were frequently
 observed
- Young stem of 8 kinds of ferns frequently sold & consumed as vegetable.
 - Microlepsia species; Pteridium revolutun (BL.) Nakai;
 Diplazium esculentum (Retz.) Swartz; Diplazium maximum
 (Don) C. Christens & four species of Diplazium.





- In April 2006, a total of 47 edible wild plants belonging to 25 families of *Magnoliophyta* & 12 edible wild plants belonging to *Pteridophyta*.
- Common edible wild vegetables were:
 - Justicia adhatoda L. (Bashikha), Plectocomia himalayana Griff (Patsha), Asparagus racemosus Willd (Ngakhagchu), Phytolocca acinosa Roxb. (Tashi gangkha), Houttuynia cordata Thunb. (Gaycho), Chenopodium album L.(Henshu), Mentha spicata L. (Ushila), Cymbiduim species (Olachoto), Pogostemon amaranthoides (Namna), Elatostema lineolatum Wight (Damroo), Oenanthe javanica (Bl.)DC (Zeemtsi), Colocasia esculenta (L.) Schotts (Dow), Thlaspi arvense L. (Gekha) Urtica dioia (Zocha) and Girardianan palmate (Zocha).



- In July 2007, a total of 26 edible wild plants belonging to 19 families of *Magnoliophyta* and 10 edible wild plants belonging to *Pteridophyta*.
- Common plants were:
 - Plectocomia himalayana Griff (Patsha), Elatostema lineolatum Wight (Damroo), Thlaspi arvense L. (Gekha), Chenopodium album L. (Henshu), Mentha spicata L. (Ushila), Cymbiduim species (Olachoto), Pogostemon amaranthoides (Namna) and Phytolocca acinosa Roxb. (Tashi gangkha).





- In October 2008, a total of 66 edible wild plants belonging to 33 families of *Magnoliophyta* and 13 edible wild plant species belonging to 4 families of *Pteridophyta* were determined.
- Some of the wild edible plants are purported to contain medicinal properties and affect human health functionally.
- However, in the case of *Pteridophyta*, they are purported to be contraindicated for cretin conditions more than positive effect for human health.
- In May 2009, a total of 78 edible wild plants belonging to 45 families of Magnoliophyta and 8 edible wild plant species belonging to 3 families of Pteridophyta.
- Some of the wild edible plants are purported to contain medicinal properties and affect human health functionally and to be contraindicated for certain conditions.





- From the 5 years investigation,
 - 108 edible wild plants belonging to 53 families of Magnoliophyta, of which 101 species have been identified
 - 20 edible wild plants belonging to 5 families of Pteridophyta, of which 15 species have been identified.
- Most common EWPS widely distributed, collected, traded & consumed are:
 - Diplazium sp. (Nakey), Plectocomia himalayana Griff (Patsha), Elatostema lineolatum Wight (Damroo), Thlaspi arvense L. (Gekha), Justicia adhatoda L. (Bashikha), Asparagus racemosus Willd (Ngakhagchu), Phytolocca acinosa Roxb. (Tashi gangkha), Houttuynia cordata Thunb. (Gaycho), Mentha spicata L. (Ushila), Cymbiduim sp. (Olachoto), Pogostemon amaranthoides (Namna), Colocasia esculenta (L.) Schotts (Dow), Bambusioideae sp. (Pakshing), Dioscorea sp., Nasturium officinale (Sim rayo) &





- From distribution & availability perspective, species under *Pteridophyta* is the most common EWPs.
- It is one of the most readily available & economical plant in the markets especially during Spring/summer to monsoon.
- It is true especially for marginal farmers as ferns can be collected easily from wild without paying any cost / royalty for both home consumption & sale in markets.
- Many families in remote Bhutan consume bracken for a very long time in the year & continue the tradition year after year.
- In some regions, ferns are considered as delicacies & preferred over other vegetables which is associated with traditional food habits.





- Various parts of plant (leaves, stem, young stem, flowers, inflorescence, tuber, fruit and seed) consumed for food.
- During spring/summer, Bhutanese eat many kinds of EWPs which shows their important role in Bhutanese diet.
- Many edible wild plants are believed to contain medicinal properties and have positive effect on human health.
 - Leaves of Nasturium officinalis improve blood, leaves of Mentha spicata L. and inflorescence of Gerardiana species reduce blood pressure, leaves of Urtica species cure tuberculosis, etc.
- Bhutanese link bitter taste of foods with their medicinal properties; therefore, prefer bitter foods made from plant such as flowers of *Adhatoda vasica* Ness, young stem of *Asparagus racemosus* Willd, inflorescence of *Cymbidium* species & young shoots of *Plectocomia himalayana* Griff.





Justicia adhatoda L. (Bashikha)





- Edible parts: Flowers
- How to eat: Flowers are eaten as delicacy, good appetizer, Boil, strain (optional) and cook with meat (optional), chili & cheese. It can be stirfried as well.





Asparagus racemosus Willd (Ngakhagchu)

- Edible parts: Young shoot / spears
- How to eat: A delicacy meal, cut into pieces, boil, strain (optional) and cook with meat (optional), chili & cheese.



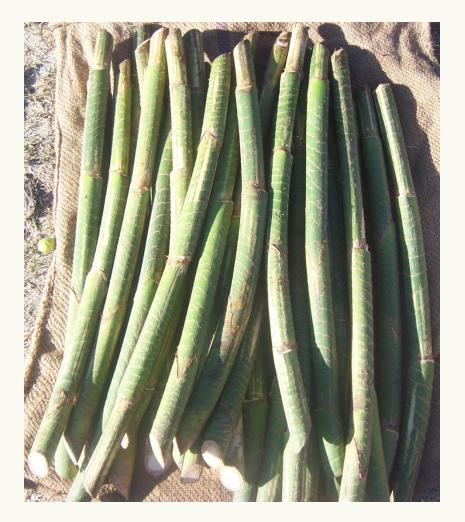






Plectocomia himalayana Griff (Patsha)

- Edible Part: Inner pith of young shoot
- How to eat: Take out the outer scales, cut into small pieces, boil it, strain (optional) and then cook as any other vegetables.





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Result and Discussion



Colocasia esculenta L. (Dow)

- Edible parts: Rhizome & petal base, shoots also dried for winter consumption
- How to eat: Boil the rhizome, peel the skin and eat as potatoes.
 Petal based can be stir fried as other vegetables.





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Result and Discussion



Cymbidium species (Olachhoto)

- Edible parts: It is an orchid, inflorescence used as delicacy, bitter taste liked by many, commonly domesticated
- How to eat: Cut into pieces, boil, strain (optional) & cook with meat (optional), chili & cheese. It can be stir-fried as well.











Bambusioideae sp. (Pakshing, Bamboo shoots)

- Edible parts: Young tender shoot preserved, canned or pickled.
- How to eat: Boil with ash, strain, then pickled it or fry as vegetables with chili, onion, meat (optional), etc.





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Result and Discussion



Elatostema lineolatum Wight (Damroo)



- Edible parts: Young shoot & leaves as delicacy vegetable
- How to eat: Appetizer, goes very well with *Plectocomia himalaya* Griff; a specialty dish during religious ceremonies, cut into pieces and cook with chili, onion, cheese, meat (optional)



