



非洲常见植物
野外识别手册

肯尼亚山



Field Guide to Wild Plants of Africa: Mt. Kenya

Editors / Ya-dong Zhou Guang-wan Hu Geoffrey Mwachala Qing-feng Wang

编著 / 周亚东 胡光万 Geoffrey Mwachala 王青锋

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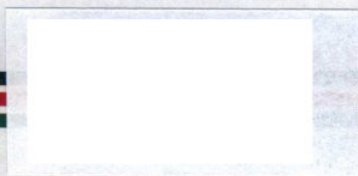
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PREFACE

When we first visited Mt. Kenya on 17th August 2011, we were impressed by the magnificent and beautiful scenery of the amazing land. In the morning, we drove up along the Sirimon Track. It was bush zone below the mountain, but gradually replaced by dense *Podocarpus* forest, with *P. milanjanus* being the most common and few *Afrocarpus gracilior*. The towering trees stood erectly on both sides of the road and in the deep forest, with the trunk regularly slightly left or few right rotated. Then the vegetation was gradually replaced by *Hagenia*-Bamboo. *Hagenia abyssinica* of the rose family, endemic species in tropical Africa, is distributed from Ethiopia to Zimbabwe and from Kenya to Congo. The only species of alpine bamboo is *Yushania alpina*, which is widely distributed in the high mountains of east Africa. Over the altitude of 3,300 m, it was the typical heath zone and scattered with giant *Lobelia* and *Dendrosenecio*. After a short rest at Old Moses Hut, we continued to climb up along the rough mountain road under the guidance of the guide Ceasar. We finally arrived at a lower peak of 4,200 m a.s.l., and along the way was typical moorland, where giant *Lobelia* and *Dendrosenecio* became dominant plants, marking the magic alpine vegetation of high mountains in East Africa.

Since then, we have visited Mt. Kenya several times and went through different routes, such as Naro Moru Track, Kamweti Track, Burguret Track, Timau Track, Meru Track, Chogoria Track etc. We also organized some hiking events across the mountain, and visited different types of vegetation, such as bushland, rainforest, bamboo zone, heath zone, moorland and even the alpine rocky zone. During these investigations, we took a lot of photos of different vegetation types and plants of the mountain. Later on, we arranged and identified these photos and hope to publish a popular handbook, which reflects the plant diversity of Mt. Kenya.

Mt. Kenya has a huge biodiversity and it is the most important habitat and breeding site for different kinds of wildlife. Based on our preliminary estimation, there are over 1,500 plant species living here, and more than 15 are endemic to this mountain. This book records 500 common plants of Mt. Kenya living in different altitudes and habitats, most of which are indigenous species, and few are common exotic, cultivated or horticultural varieties.

This guide is an easy-to-carry field handbook, with colored pictures and refined texts. We hope it will bring pleasure and satisfaction to readers, especially the tourists who are keen on mountaineering of the high mountains of east Africa.

Editors

March 1, 2018

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INTRODUCTION OF MT. KENYA

Location

Mt. Kenya ($0^{\circ} 10' S$, $37^{\circ} 20' E$) (Fig. 1) is the largest ancient extinct volcano in Great Rift Valley areas, and the second highest peak in Africa, which reaches up to 5,199 m a.s.l. (the highest one is Mt. Kilimanjaro, 5,892 m a.s.l.). It straddles the equator and is located in the central part of Kenya, about 193 km north-east of Nairobi and 480 km from Kenya coast.

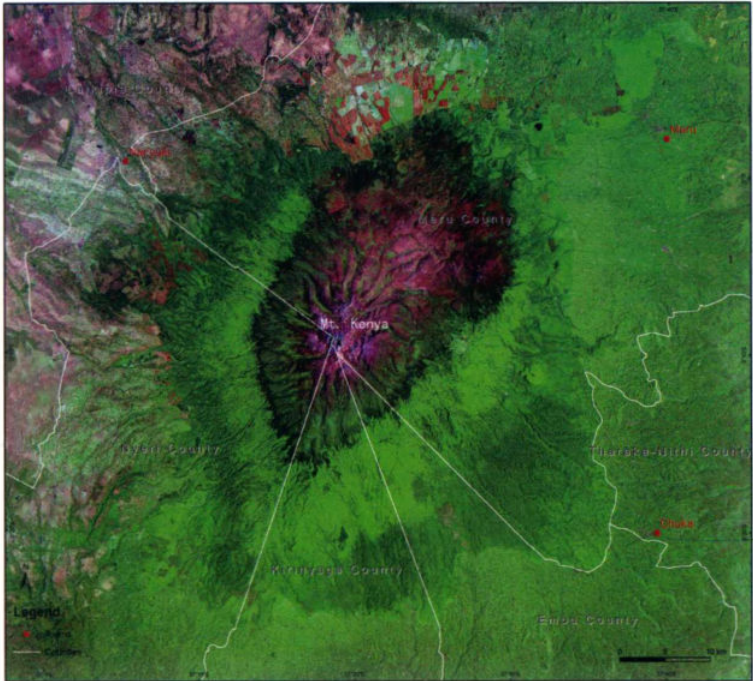


Figure 1. Remote sensing image of Mt. Kenya (Provided by X.H. Wei from Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences).

Mt. Kenya consists of two administrative units: the Mt. Kenya National Park (upper zone, above 3,200 m a.s.l., and the Naro Moru and Sirimon salients; ca. 694 km²) managed by the Kenya Wildlife Service (KWS), and the Mt. Kenya Forest Reserve (Lower Imenti Forest, Upper Imenti Forest and Thunguru Hill Forest; over 2,000 km²) managed by the Kenya Forest Service (KFS). Mt. Kenya is partitioned in two forest conservancies and five forest management zones: Nyeri and Kirinyaga in Central Highlands Conservancy and Meru Central, Meru South and Embu in Eastern Conservancy.

Geology and Soils

Mt. Kenya is the highest mountain of Kenya and second highest in Africa with its icy summit reaching at three peaks: Point Batian (5,199 m a.s.l.), Point Nelion (5,188 m a.s.l.) and Point Lenana (4,985 m a.s.l.). The mountain is broadly cone-shaped with deeply incised valleys (e.g. Gorges Valley, Fig. 2) radiating from the peaks, which are largely attributed to glacial erosion.



Figure 2. Gorges Valley, below Lake Michaelson, east slope of Mt. Kenya.

The soils of Mt. Kenya are classified into four categories according to altitudes and aspects: 1) above 4,000 m a.s.l., the soils are Leptosols, Regosols and Greysols; 2) between 2,400 and 4,000 m a.s.l., there are Regosols, Histosols and Andosols; 3) below 2,600 m a.s.l. and in the forested mountain areas to the eastern, southern and western slopes where there is plentiful rainfall, the soils are Nitisols, Cambisols and Andosols; 4) the western plains and to the northwestern of the mountain (Grassland zone with low rainfall), there are Phaeozems, Planosols and Vertisols.

Climate

Mt. Kenya has two wet and two dry seasons: a long wet period is from March to June followed by a short dry phase in July, another wet period is from August to November and then a long dry period from December to February. The annual rainfall ranges from 900 mm in the north to 2,300 mm in the southeastern slopes, with heavy rains during months from March to June and October to November. The maximum humidity zone lies on the southeastern side of the mountain at 1,850–3,000 m a.s.l. with annual precipitation of over 2,500 mm, and the western side between 3,000 and 3,600 m a.s.l. comes the second with annual precipitation of 1,500–2,000 mm, followed by the northern side between 3,000 and 4,000 m a.s.l. (annual precipitation: 800–1,200 mm). The annual temperature is about 2 °C, with the lowest value from March to April and the highest from July to August. The diurnal temperature range is large, amounting to about 20°C from January to February and about 12 °C from July to August.

Vegetation

Mt. Kenya ecosystem constitutes an important reservoir for plant diversity, and hundreds of plants thrive here, including some endemic and endangered species. In 1885, Hooker and Oliver published the first checklist of plants in the regions of Mt. Kenya, recording 140 species collected by Thompson in 1883 and 1884. From 1922 to 1948, R.E and T.C.E. Fries studied the flora of Mt. Kenya and the neighboring Mts. Aberdare. Hedberg investigated the East African high mountain vegetation in 1951, 1957 and 1964, and he also studied the zonation of the vegetations of Mt. Kenya, and finally came up with three main belts: Montane forest belt, Ericaceous belt and Alpine belt. Bussman identified 882 species, subspecies and varieties belonging to 479 genera in 146 families below 3,200 m a.s.l. of Mt. Kenya in 1994.

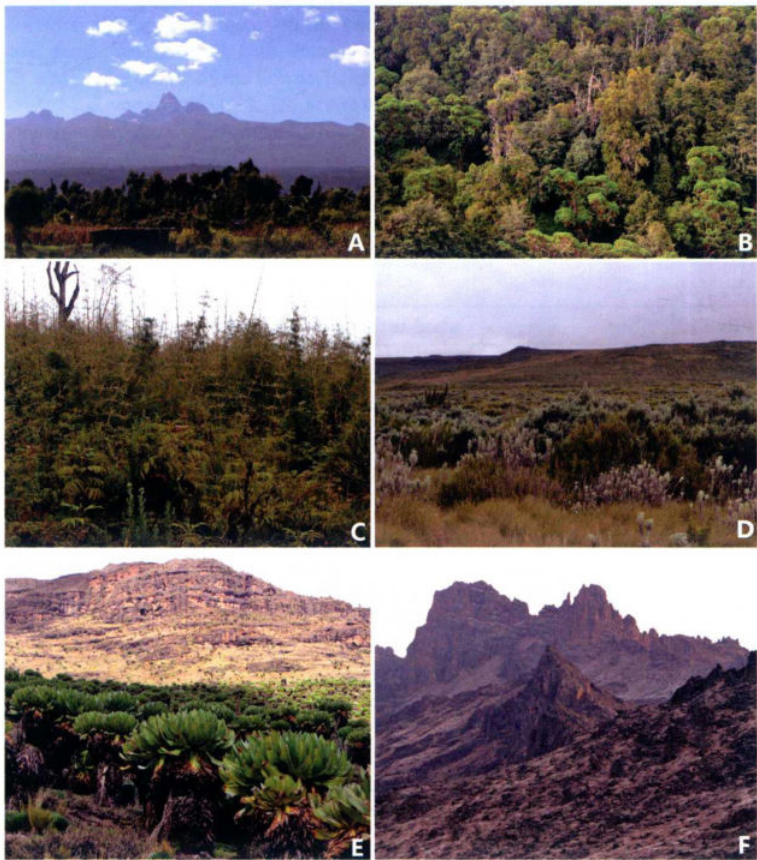


Figure 3 Vegetation types of Mt. Kenya. A. Bushland and cultivated land at the foot of Mt. Kenya; B. *Podocarpus* zone; C. Bamboo zone; D. Heath zone; E. Afro-alpine Vegetation; F. Nival zone.

Bushlands are predominant in the drier parts of lower zones (below 2,000 m a.s.l.) (Fig. 3A). These areas are usually close to the cultivated lands, with some degree of human disturbance, and growing a large number of exotic plants. Between 2,000 and 2,400 m a.s.l., *Juniperus* and *Podocarpus* are predominant, with annual rainfall between 875 and 1,400 mm (Fig. 3B). From 2,400 to 3,200 m a.s.l., there is bamboo zone associating with *Hagenia*, *Podocarpus* and *Sambucus africana* (Adoxaceae) (Fig. 3C). Between 3,200 to 3,600 m a.s.l. lies the heath zone, in which *Erica* are the dominant plants, also associated with *Alchemilla*, *Helichrysum* and *Artemisia*. (Fig. 3D). Between 3,600 to 4,200 m a.s.l. is the most famous Afro-alpine vegetation, which is dominated by giant *Lobelia* and *Dendrosenecio* (Fig. 3E). Above 4,500 m a.s.l. is nival zone, few survive in this area with an exception of some cold-resistant plants, such as *Senecio purtschelleri*, *Arabis alpina*, *Valeriana kilimandscharica* and *Haplosciadium abyssinicum* which grow in the shades of rocks (Fig. 3F).

HOW TO USE THIS BOOK

In this book, the traditional classification system or latest APG IV is not applied to arrange the species. Instead, we classified plants based on growth forms and morphological characters, in the hope of easier grasp by amateur. We divided all the 500 plants into six parts, Trees, Shrubs, Lianas or climbers, Herbs, Grass-like Herbs, Lycophytes and Ferns. In each part, the main morphological characters are further used to divide species into several sub-units, such as leaf characters for trees, shrubs and ferns, flower colour for herbs, stem characters for lianas or climbers. We also used the distribution information to divide shrubs, as different species were commonly found in different vegetation types.

The following table includes the main keys of this book. When you come across a common plant in Mt. Kenya, you can search for it by taking following steps: 1) is it a tree, shrub, liana, climber, herb, grass or fern? If it is a herb, you should check part 4; 2) what is the colour of the flowers/inflorescences of this species? If it is pink, red or orange-red, you should check 4.2; 3) Are the flowers actinomorphic or zygomorphic? If zygomorphic, you should check 4.2.1, and go to pages 137–138.

1 Trees	1.1 Leaves subulate, needle-like or linear		012–014		
	1.2 Leaves simple	1.2.1 Leaves opposite or whorled		014–019	
		1.2.2 Leaves alternate		019–022	
		1.2.3 Leaves crowded on stem apex		023–024	
	1.3 Leaves compound	1.3.1 Leaves palmately compound		025	
1.3.2 Leaves pinnately compound		026–027			
2 Shrubs	2.1 Leaves subulate, needle-like or linear		030–034		
	2.2 Leaves simple	2.2.1 Leaves opposite or whorled		035–044	
		2.2.2 Leaves alternate or fascicled	2.2.2.1 Plants always in bushland or open forest		044–049
			2.2.2.2 Plants always in montane forest or bamboo zone		049–055
			2.2.2.3 Plants always in montane grassland or moorland		055–058
	2.2.3 Leaves crowded on branches apex		059–060		
	2.3 Leaves compound	2.3.1 Plants spiny		061–063	
2.3.2 Plants unarmed		064–068			

3 Lianas or climbers	3.1 Woody plants	3.1.1 Cladodes needle-like or linear		070	
		3.1.2 Leaves simple		071–075	
		3.1.3 Leaves compound		076–077	
	3.2 Herbaceous plants	3.2.1 Leaves simple		078–086	
		3.2.2 Leaves compound		087–089	
4 Herbs	4.1 Flowers/Inflorescences always cream or white	4.1.1 Flowers large, actinomorphic	4.1.1.1 Flowers 3-merous (petals/tepals 6)	092	
			4.1.1.2 Flowers 4-merous (petals/tepals 4)	092–097	
			4.1.1.3 Flowers 5-merous (petals or corolla-lobes 5)	098–112	
			4.1.1.4 Tepals many	113	
		4.1.2 Flowers zygomorphic	4.1.2.1 Flower labiate	113–120	
			4.1.2.2 Flowers papilionaceous	120	
			4.1.2.3 Flowers with spur	121–123	
		4.1.3 Flowers minute and forming head-like inflorescences		124–131	
	4.1.4 Flowers forming spike-like inflorescences		132–134		
	4.2 Flowers/Inflorescences red or orange-red	4.2.1 Flowers actinomorphic		135–136	
		4.2.2 Flowers zygomorphic		137–138	
	4.3 Flowers/Inflorescences yellow, pale yellow orange-yellow or brown	4.3.1 Flowers actinomorphic		139–147	
		4.3.2 Flowers zygomorphic		148–151	
		4.3.3 Flowers minute and forming head-like inflorescences	4.3.3.1 Capitula solitary or very few		152–158
			4.3.3.2 Capitula many		159–168
		4.3.4 Flowers minute and forming spike-like inflorescences			169
	4.4 Flowers/Inflorescences green or very small and hard to see	4.4.1 Flowers actinomorphic		170–178	
		4.4.2 Flowers zygomorphic		179–180	
		4.4.3 Flowers several in axillary clusters or in head-like inflorescences		180–183	
		4.4.4 Flowers forming spike-like inflorescences		184–187	
		4.4.5 Flowers hard to see or with other characters		187–189	
4.5 Flowers/Inflorescences blue or pale blue	4.5.1 Flowers actinomorphic		190–192		
	4.5.2 Flowers zygomorphic		193–201		
	4.5.3 Flowers in head-like inflorescences		202		

4 Herbs	4.6 Flowers/ Inflorescences pink, pale mauve, purple, red purple	4.6.1 Flowers actinomorphic	203–213
		4.6.2 Flowers zygomorphic	214–226
		4.6.3 Flowers minute and forming head-like inflorescences	226–234
		4.6.4 Flowers minute and forming spike-like inflorescences	235–236
5 Grass- like Herbs	5.1 Wick grass		238–240
	5.2 Sedges		240–251
	5.3 Bamboo		252
	5.4 Grass		253–262
6 Lycophytes and Ferns	6.1 Lycophytes		264–265
	6.2 Ferns	6.2.1 Fronds simple	266
		6.2.2 Fronds dichotomously divided	267
		6.2.3 Fronds 1-pinnatifid to 1-pinnate	267–269
		6.2.4 Fronds 2-pinnatifid or 2-pinnate	269–273
		6.2.5 Fronds 3(or more)-pinnate or 3(or more)-pinnatifid	274–278

PART 1

TREES



Tall and large woody plants, usually more than 6 m high, with independent trunk from the root. There is obvious distinction between trunk and crown.

1.1 Leaves subulate, needle-like or linear**001** *Afrocarpus gracilior* (Pilg.) C.N. Page**Podocarpaceae**

Evergreen tree up to 36 m high, with grey to dark brown bark flaking in long irregular rectangles. Leaves linear, 2–4 × 0.2–0.4 cm. Male cones 1–3, yellow-brown, axillary, ca. 2.3 cm long. Female cones solitary, up to 2.5 cm long. Fruits (seeds) ellipsoid or globose, 1.4–2.3 cm long, without receptacle.

☒ Rainforest, often associated with *Juniperus*, 1800–2700 m.

📍 Near Ontulili Forest Station, at ca. 2200 m.

**002** *Cupressus lusitanica* Mill.**Cupressaceae**

Evergreen tree up to 35 m or more high, with red-brown to grey, longitudinally fissured bark. Leaves scale-like, 2–5 mm long. Male cones yellowish, small. Female cones globose to oblong, 1–2 cm in diameter, with 4–10 scales. Seeds small, narrow-winged.

☒ Exotic plants, cultivated for timber at the foot of Mt. Kenya.

📍 Burguret Track, at ca. 2300 m.

