

## **World Soil of the Year 2026**

### **Acrisols from the Low Hills of Southwestern Guangdong, Subtropical China**

#### **Soil formation**

The soil forming environment is a low hilly landscape in southwestern Guangdong, China, governed by a maritime monsoon climate that straddles the southern margin of the subtropics and the northern edge of the tropics. The region experiences a mean annual temperature of 23.0–24.0 °C and average annual precipitation of 1500–1700 mm, with pronounced seasonal contrast between wet and dry periods—conditions that provide a defining bioclimatic setting for soil genesis. The area develops on parent materials consisting of residual and colluvial deposits derived from granite weathering. Under the combined influence of high temperatures and abundant rainfall, granite undergoes intense and pervasive chemical weathering: silicate minerals decompose extensively, and base cations—such as calcium, magnesium, and potassium—are progressively leached downward by percolating rainwater. This strong desilication and base depletion result in soils with total potassium contents below 2.0 g/kg and an acidic to strongly acidic reaction (pH 4.0–5.0). Soil formation is characterized by active translocation and accumulation processes. Clay particles generated in upper horizons migrate downward through the profile under the influence of percolating water and accumulate in the subsoil, giving rise to a well-defined argillic (Bt) horizon. Concurrently, prolonged weathering and biogeochemical cycling promote the relative enrichment of iron and aluminum oxides, leading to the development of ferrallic properties. Over time, these processes yield a deep soil profile (>100 cm), with the texture ranging from loam to clay.

#### **Functional relevance of these soils for humans and environment**

The deep soil profile (>100 cm) in this region provides a stable foundation for agriculture and forestry. A fairly large part of such soils especially in low hills and on gentle slopes are cultivated for growing tropical fruits, maize, sweet potato and other upland crops. Much of the soil is under forest supporting economically important tree species such as slash pine, eucalyptus, rubber, and litchi, as well as serving as a habitat for agarwood (*Aquilaria sinensis*, locally known as “Chen Xiang 沉香”)—a highly valued medicinal and aromatic tree.

Maoming's Acrisol acts as a natural cradle for Lingnan's iconic fruit, the lychee. Although these soils are inherently acidic, nutrient-poor, and clay-rich, their warmth and depth are well-suited to lychee cultivation. The acidity helps shape the fruit's signature sweet-tart balance, while the deep soil allows for extensive root development, aiding in nutrient and water uptake. This synergy produces the large, brightly colored, thick-fleshed, and flavorful fruit that has made

Maoming the world's largest lychee production base. Beyond agriculture, the lychee carries deep cultural significance, celebrated since the Song dynasty by the poet Su Shi (1037–1101) and today forming a key economic pillar for the region.

Agarwood also holds deep cultural significance in China, with over 1,000 years of use in medicine, religious rites, scholarly life, and imperial courts, and is revered as the “noblest of all fragrances” for its calming, enduring aroma. High-quality resin forms only under stress—such as wounding or infection—in acidic, well-drained, nutrient-poor soils. This soil’s strong acidity, low fertility, and good aeration provide ideal conditions for such resin formation. Leveraging this ecological match, local communities have developed a thriving agarwood industry, turning seemingly marginal land into a living vessel for China’s intangible incense heritage.

Ecologically, this soil is key to regional stability, supporting natural and planted forests of eucalyptus, shrubs, and herbs that enhance cover and sequester carbon. It stores and channels water, regulating local hydrology, while providing refuge for forest-adapted species and safeguarding biodiversity. Under sustainable management—such as mixed conifer-broadleaf planting—it also reduces erosion and boosts ecosystem resilience.

It should be pointed out that Acrisols are widely distributed in South and Southeast Asia, Africa and Latin America, contributing substantially to the agricultural development of the Global South.

### **Soil degradation threats**

These soils are inherently vulnerable to degradation due to low native fertility, weak structure, and a regional climate characterized by high temperatures and intense seasonal rainfall. Their low erodibility resistance renders them prone to water erosion on sparsely vegetated slopes, resulting in topsoil loss. Large-scale monocultures of *Eucalyptus* spp., coupled with frequent short-rotation harvesting, have significantly exacerbated acidification: continuous biomass removal depletes soil organic matter and further reduces pH, while simplifying vegetation structure suppresses understory plant diversity and microbial activity. These interacting processes collectively diminish the soil’s ecological carrying capacity for high-value species such as *Aquilaria sinensis*, thereby compromising long-term ecosystem functionality and sustainable land use.

### **Location of this soil**

Acrisols, as zonal soils formed under subtropical humid conditions, are extensively distributed across the low hilly slopes of southwestern Guangdong Province, China. These soils result from long-term pedogenic processes characterized by intense weathering, clay illuviation, and acidification—features typical of the region’s climatic regime. The described soil profile is in

Dianbai District, Maoming City (21°29'12"N, 110°56'04"E), which is 7 km away from the south China sea.

### Classification WRB

Xanthic Ferralic **Acrisols** (Hyperdystric, Ochric)

### Chinese Soil Taxonomy

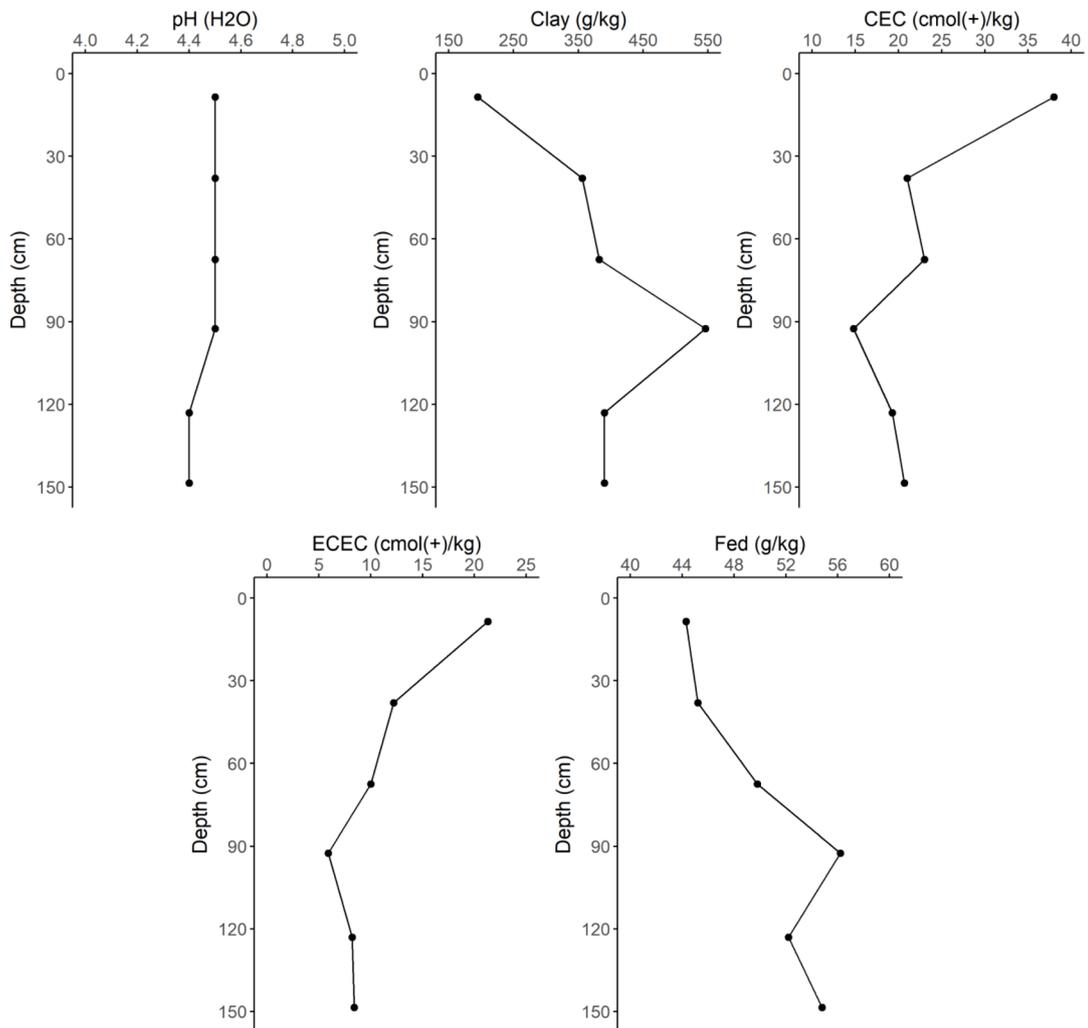
Typic Hapli-Udic **Ferralsols** (普通筒育湿润铁铝土)

Profile environment				
Coordinates (WGS 1984):	Lat:	21°29'12" N	CGCS 2000 X	37493206
	Lon:	110°56'04" E	CGCS 2000 Y	2376962
Elevation a.s.l.		38.0m	Soil climate	Thermic
			Soil moisture regime	Udic
			Land cover:	Forest
			Land use:	Forest land
			Parent material:	Residual and colluvial materials from granite weathering
			Ground water	
			Further information:	

Profile description	Horizon	Depth (cm)	Description
	<b>Ah</b>	<b>0-17</b>	Yellowish orange (7.5YR8/8, dry), orange (5YR6/8, moist); loose; moderately developed 5-10 mm blocky structure; sandy loam; abundant medium-sized roots; approximately 5% angular quartz grains (2-5 mm); smooth gradual transition to the underlying horizon
	<b>Bts1</b>	<b>17-59</b>	Pale yellowish orange (7.5YR8/6, dry), orange (5YR6/6, moist); relatively loose; blocky structure (10-20 mm); clay loam; moderate amount of medium-sized roots; approximately 5% angular quartz grains (2-5 mm); smooth gradual transition
	<b>Bts2</b>	<b>59-76</b>	Pale yellowish orange (7.5YR8/4, dry), orange (5YR6/8, moist); blocky structure



	(cm)	(H <sub>2</sub> O)	(KCl)	(g/kg)				cmol (+)/kg		(%)	(%)	(g/kg)	(%)
				14.8	1	0.49	1.7	38	21.3	22.4	60	44.3	63.6
Ah	0-17	4.5	3.6	14.8	1	0.49	1.7	38	21.3	22.4	60	44.3	63.6
Bts1	17-59	4.5	3.6	13.3	0.78	0.39	1.8	21	12.2	11.7	79.8	45.2	74.9
Bts2	59-76	4.5	3.7	13.9	0.76	0.29	1.7	23	10	9	79.3	49.8	80.5
Bts3	76-109	4.5	3.8	7.4	0.42	0.31	1.3	14.8	5.9	11.2	71.7	56.2	86.0
Bs	109-137	4.4	3.8	4.8	0.54	0.27	1.7	19.3	8.2	8.9	79.1	52.2	76.4
BC	137-160	4.4	3.8	4.2	0.24	0.24	1.7	20.7	8.4	7.4	81.7	54.8	79.4



Selected soil properties for this profile.