

Optimization of a novel *Renalmia ligulata* (Zingiberaceae) essential oil extraction method through microwave-assisted hydrodistillation

1. Taxonomic description of the *Renalmia ligulata* specimen

The taxonomic confirmation of the plant material resulted from the following description: the species is characterized because they are herbs of 2.2-6 m, rhizomatous, aromatic, erect and leafy, forming colonies of 4-6; ligule translucent yellow to golden brown, with golden yellow pubescence. Leaves coupled, 6-10 per axis, coriaceous, glabrous, the blade narrowly elliptic, 23-66 x 9.3-14.2 cm, the base cuneate, asymmetric, the margin ciliate, the apex pointed. Inflorescence 1 to 3 compound racemes per stem, basal, cylindrical, 20-47 x 5.5-13 cm; Fuchsia-reddish scape erect before and during flowering, burgundy and gradually prostrate during fruiting, 8.5-33.4 cm, surrounded by fuchsia-red to pinkish bracts, in the basal part and scarred by the fall of these as that grows; rachis conspicuous, red, quadrangular, floral bracts conspicuous, whorled, dark red to brown when aged, subtending 1-3 flowers. Flowers visible, fleeting, bisexual, blooming 3 per day; rachis conspicuous red to fuchsia, cylindrical. Calyx dark red, fuchsia at the base, pinkish to yellow towards the apex, leathery, 1.9-2.5 cm x 7.9-8.2 mm, tubular, with yellow to golden hairs. Corolla white to pink, herbaceous to membranaceous, 1.1-3.2 x 1.5 cm, tubular. Lip White, maculate, with transparent streaks in the exposed area, turning fuchsia-reddish towards the center, spatulate, 1.3-1.8 x 1-1.2 cm, tri-lobed; lateral lobes regular, rounded, exceeding corolla, margin wavy; central lobe rounded; lateral staminodes red to fuchsia at the base, the apex white, filiform, glabrous; stamen sessile, attached to base of perianth, glabrous; anther white, towards the apex pink to fuchsia, pollen white. Ovary red to fuchsia, nectar glands completely surrounding base of style, white to cream. Fruit a trilobular capsule, bright red to fuchsia when young, dark red when ripe, globose, 2.1-5 x 2.3-4.2 cm, the persistent calyx forming a crown, brown, glossy, globose seeds, 44- 47 per locule, 2-3 mm diam., aromatic, astringent.

1.1. Further taxonomic considerations.

Renalmia ligulata features a tall and robust habit, basal inflorescences in a well-defined thyrus, erect when flowering and prostrate when fructifying, peduncle, rachis and red pedicels, white lip with pinkish to intense red towards the center and fuchsia-reddish towards the basal margins and the red, large and heavy fruits make it an easily recognizable species.