

## Origin, Classification and Distribution of *Typha* Species a Paradigm for Understanding the Biology and Ecology of the Wetland Emergent Plant Species

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### Abstract.

*The paper highlighted the origin, distribution and classification of Typha. The plant is cosmopolitan found in almost all continents except Antarctica. It's a wetland species and is highly invasive spreading through wind dispersed seeds and vegetatively through their rhizome. They are erect tall wetland species that is emergent and form a thick and dense monoculture dominating other species. Three major species were identified Typha latifolia, Typha angustifolia and the hybrid form from the two species Typha glauca. Most parts of the plant are edible. Their invasive nature has implication for biodiversity. They form habitat for some wildlife species. Their thick dense vegetation block water ways and caused siltation and blockage of waterways.*

## Introduction

From information available in the Flora of west tropical Africa (Hutchinson and Dalziel, 1952-1972). *Typha* is probably not an exotic species to Nigeria. It is found from the extreme south to the extreme northern end of Nigeria. The species have been found to be invasive in Hadejia Valley irrigation scheme threatening many economic activities in northern Nigeria (Olayinka et al., 2022). The plant which can grow up to two or more meters in height has a higher growth rate than any other aquatic plant in its family (Zungum, IU; Imam, 2019). One species of *Typha* is probably found in and all other tropical parts of the world. The *Typha* genus is found on every continent with the exception of Antarctica. It can be found throughout US and southern Canada, in Temperate North America, Europe and Asia (Aliero et al., 2022). According to (M. Larry, 2000) Common cattail can also be found in Russia, Morocco, India, Iran, Mexico, the Philippines Portugal and Greece where they act as weed of rice. The species was first discovered in the lake Chad Basin. *Typha* is a water-loving plant that can multiply and become difficult to control in favourable conditions making it invasive (Y. Birnin Yauri, Abdullahi, M.L. Balarabe, 2019).

## Geographical range and distribution.

*Typha* is a cosmopolitan plant (El-amier, 2013; Shih & Finkelstein, 2008). This is attributed to its ability to tolerate a wide range of climatic conditions and can thrive in both humid coastal and dry continental climates. Cattails are essential components of wetland around the world. they can also be problematic invaders (Ciotir et al., 2017). *Typha* is an emergent monocotyledon which produces erect, approximately linear leaves from extensive anchoring systems of rhizomes and roots (Salako et al., 2016). Details of how *T. latifolia* spread beyond its native range are difficult to ascertain, partly because there are so few regions in the world where it is not native. *T. latifolia* is a perennial plant that belongs to the genus *Typha*. It is a native plant species of North America (ranging from Alaska to Guatemala (Xu et al.,

2013). Furthermore, similarities between *T. latifolia* and native *Typha* species may have helped obscure invasions of new areas. Even in North America, where *T. x glauca* (hybrid of *T. angustifolia* and *T. latifolia*) has recently been seen to occupy a much larger distribution, the history of the spread of *T. x glauca* and the mechanisms involved have yet to be worked out (Shih and Finkelstein, 2008; Zhang et al., 2008). It ranges from Arctic Circle to latitude 30° S and it prevails in water depths of 15 to 50cm. It can occupy a space of 58m<sup>2</sup> within 2 years after seed establishment (Mitich, 2000). Furthermore, In the US the native range of *Typha* includes the Alaska, continental US and Hawaii. In Africa It is common in (Algeria, Morocco, Ethiopia, Kenya, Tanzania, Uganda and Nigeria). In Asia – temperate it is found in Afghanistan, Iran, Israel, Jordan, Lebanon, Syria, Turkey, Armenia, Azerbaijan, Georgia, Russian federation-Ciscaucasia, Dagestan, Russian federation, Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan, Mongolia, China and Japan. In Asia-tropical it's found in Pakistan. In Europe it is found in Denmark, Finland, Ireland, Norway, Sweden, United kingdom, Austria, Belgium, Czechoslovakia, (the present Czech republic and Slovakia) Germany, Hungary, Netherlands, Poland, Switzerland, Belarus, Estonia, Latvia, Lithuania, Moldova, Russian federation European part, Ukraine, Albania, Bulgaria Greece, Italy Romania, Ex-Yugoslavia, France, Portugal Spain. Northern America (Canada, USA) Southern America (Guatemala, Mexico, Brazil Argentina, Paraguay) (Bansal, Lishawa, Newman, Tange, et al., 2019). *Typha latifolia* is the only species of cattail usually found in relatively undisturbed habitats throughout North America.

## 2.2.4 Habitat Description.

*Typha* can be found in wetlands, sedge meadows, along slow-moving streams, river banks, and lake shores. The plant is found in areas of widely fluctuating water levels such as roadside ditches, reservoirs and other disturbed wet soil area (K. Motivans, 1987). *T. latifolia* and *C. rotundus* are the most common wetland species found in

tropical, subtropical and temperate regions of the world(Shingare et al., 2017).

In addition, *Typha* can be found growing in all our wetlands from open bogs to deep marshes, they can be found growing on any wet substrate and often in standing water that are not more than 1 to 2 feet deep. *Typha latifolia* is found in the most favorable sites where it competes against other species. *T. angustifolia* and *T. domingensis* are restricted to less favorable and more saline habitats when they occur with *T. latifolia*(K. Motivans, 1987). Cattails' tolerance to different climatic conditions and environmental changes helps them withstand a different climatic conditions under different habitats(Baldwin & Cannon, 2007). It grows where the soil is always wet and saturated with moisture. They also occur in shallow and brackish water they also occur in slightly brackish marshes. *Typha* prefers soil with high amounts of organic matter it can also grow on soil with fine texture minerals. In short, they are mostly found around coastland, estuaries, lakes, riparian zones, water courses and wetlands. Their high rapid growth makes them form a dense monoculture and eliminate other native plant species when hydrology, salinity, or fertility changes(Vetayasuporn, 2007).

### Description of *Typha* grass

The name *Typhus* is from the Greek *Typha*, meaning a cat's tail, smoke or a cloud, referring to the plant's appearance when seeds are released. The species name *latifolia* refers to the leaf width of the plant: *lati* for broad or wide, and *folia* for leaf. The common name cattail is frequently used to refer to the entire genus *Typha* in the literature. Common cattail is recognised by its iris like leaves and its terminal, fat, cigar-shaped, brown surfaced spike of densely packed, wholly fibres (Mitich, 2000). *Typha* is an aquatic plant that is rooted in the soil(Elbersen, 2005).

Furthermore, *Typha* spp are tall and erect rhizomatous and perennial aquatic plants growing to 3 m tall with creeping rhizomes up to 70 cm long and from 0.5 to 3 cm in diameter(Mitich, 2000). The leaves are basal, erect, linear, flat and tall with 12-16 leaves arising from each vegetative shoot(Bansal, Lishawa,

Newman, & Wilcox, 2019). The leaves are borne on either side of a stout, cane-like stem. They are thick and pale greyish-green in colour and the plant produces flower in May and June. They are among the most common of all aquatic plants. They usually grow along the shore line but may grow in water 3 to 4 feet deep(Albert Banunle, Bernard Fei-Baffoe, 2021). *Typha* (derived from Greek word Typhos for marsh is a glabrous aquatic or semi aquatic, rhizomatous, herbaceous perennials rooted in mud. It has alternate leaves that are simple, linear, entire, sessile with sheathing base and exstipulate. cattail flowers very numerous in dense, cylindrical, complex spike unisexual. the seed is a small nut surrounded by hairs and may be best considered as a one-seeded -achene-like structure but dehiscent(El-amier, 2013).

Nevertheless, *Typha* is a highly flood tolerant species with capacity for internal pressurized gas flow to rhizomes through a well-developed aerenchyma system that provides oxygen for root growth in anaerobic substrates(Li et al., 2010). All of its morphological parts are edible, but the rhizome is the most valuable. Its starch content can be up to 70% of the dry mass(Agata Kurzawska, Danuta Gorecka, 2014). Shoots arise from a stout rhizome. The stem terminates in a spike with unisexual flowers, the males being more terminal. The male flowers fall off after maturity and the fruits develop from the bottom of the spike upwards. Several flat cauline leaves up to 22mm wide, can reach four meters in length (Mohlenbrock 1970). The rhizome at the base of a plant tends to be somewhat enlarged(Grahame, 1970).The plants can be densely packed with stems that can be more than one foot. It has tiny flowers with male cluster at the top and the female flowers cluster at the bottom. Leaves are strap like and stiff, rounded on back flat and D shaped. Leaves are straight in the bottom half but twisted and spiral in the top(Bansal, Lishawa, Newman, & Wilcox, 2019). The fruit is tiny and tufted nut let, they are ribbon like, flat, and about one inch wide. The seeds are minute and numerous(Baldwin & Cannon, 2007). Boreal Forest (2005) states that the distinguishing characteristics of cattail are the possession of brown male flower, minute, less than 1.3cm long,

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thickly clustered, anthers 1-3 mm long. Female flowers are tiny 2-3 mm long when in flower, 10-15 mm long when in fruit. Female fruiting spike are pale green when in flower, drying to brownish, later brackish brown or reddish brown in fruit. Seeds are minute and numerous". Flowers are in a dense, cylinder- shaped spike that often resembles a cigar. Flowers are on stalks that are usually taller than the leaves.

Furthermore, they are spread by creeping root stalks and seeds. After germination, common cattail develops two to four small leaves followed by two to six floating leaves before the erect leave emerge(Mitich, 2000). When shoot reaches 35 to 45 cm in length, rhizome formation begins this coincides with a deceasing growth rate of the emergent tissue. Once the rhizomes are 35 to 60 cm long, they form shoots. In a single season, approximately 100 shoots and lateral buds are produced. Plants originating from seeds do not flower during the first season (Mitich, 2000). *Typha spp.* can spread quickly and widely through aggressive rhizomatous growth and through sexual reproduction(Shih & Finkelstein, 2008).

**Biological classification.**

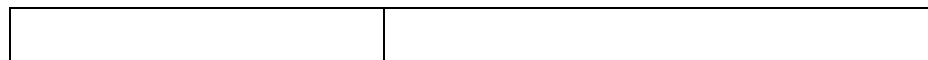
The genus *Typha* was erected in 1753 by Carolous Linnaeus in his genera plantarum. The genus *Typha* belongs to the family *Typhaceae* comprising about 30 species.These plants are known as reedmace or bulrush in British English and cattail in American English(Pandey & Verma, 2018).

The common name of *Typha* is Cattail grass(Mitich, 2000). It is known as Cooper's reed cumbungi (Australia), espadana comun (Spanish), giant reed- mace, great cattail, piriopie (Spanish) Roseau a des etangs (French), soft flag, tabua-larga (Portuguese) totora (Spanish), tule espidilla (Spanish). (DPIWE, 2006), It belongs to the class of Monocotyledons known as the Liliopsida and subclass commelinidae; order *Typhales*, Family *Typhaceae* and the genus *Typha*.(Vetayasuporn, 2007). In many parts of North America, cattails ( *T. latifolia*, *T. angustifolia* and their hybrid, *T.X glauca*) have been identified as increasingly aggressive invaders of wetlands(Ciotir et al., 2013). Cattails are highly productive emergent plants that grow in a variety of wetland habitats throughout the World(Huisman et al., 2012). *Typha latifolia* and *T. angustifolia* largely share the same morphology. Both are erect, rhizomatous perennials(Y. Birnin Yauri, Abdullahi, M.L. Balarabe, 2019). Shoots are formed by long linear leaves sheathing at the base(Heinz, 2012).

**Table 2.1 Taxonomic classification of *Typha* grass**

Category	Taxa
kingdom	Plantae
Division	<i>Magnoliophyta</i> (Angiosperms)
Class	<i>Liliopsida</i> (the monocotyledons)
subclass	<i>commelinidae</i>
order	<i>Typhales</i>
Family	<i>Typhaceae</i>
Genus	<i>Typha</i>
species	<i>Angustifolia, latifolia and domingensis</i>

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Source: M. Larry, 2000.

Many different species of *Typha* occur commonly in wet soil, marshes, swamps, and shallow waters throughout the world. They include: -

- *Typha angustifolia*- Narrow- leaved cattail
- *Typha latifolia*- Broad- leaved cattail
- *Typha glauca*- hybrid between the two species above and
- *Typha australis*. *Typha australis* is the specie found in Hadejia –Nguru wetland conservation area.

Apfelbaum, (1985) noted that there are three species of cattail that are common to North America. They include the broad –leaved (*T. latifolia*) , narrow –leaved (*T. angustifolia*) and tall cattails (*T. domingensis*). Broad –leaved cattail are found throughout North America except for the far North from sea level to 2134 ( 7000ft (Pérez, 2003).

#### Productivity in *Typha* Grasses (Yield).

*Typha* plants are among the most productive plant species; however, their performance is strongly influenced by the environment. The seed can germinate without oxygen (Vaccaro, 2005) (Henderson et al., 2000). According to Apfelbaum, (1985) productivity and growth rate in cattail can be measured and quantified. In Indiana this has been tried based on dry weight. *Typha* is the primary producer of estuarine ecosystems, which has the ability to concentrate elements and compounds from the polluted soils and water bodies and to metabolize molecules in its tissues. Consequently, it can incorporate large amounts of elements from the environment (Minkina et al., 2021). It was also found that Cattails contributed 700 kilograms (1543 pounds) of biomass per hectare (approximately 600lbs/acre) where it grew in monocultures. Aerial photographs showed cattail growth increase from 2 to 37.5 hectares (5-93 acres) from 1938 to 1982. in sedge- grass and prairie meadow vegetation as Cattail increased. At Horicon Marsh monotypic growths of cattail l increased from 30 to 80 percent cover from 1947 to 1971 (Apfelbaum, 1985).

#### 2.2.11 Local Dispersal Methods.

Regeneration and spread takes place primarily through rhizome growth, but establishment with seed at shore line is also possible, especially when water level drops (M. Larry, 2000) *T. latifolia* seed may be transported by wind, in water, in mud on the feet of birds and livestock, or by humans and machinery. Up to 95% of all seed produced is viable (Miklovic, 2000). A single *Typha* inflorescence will produce 20,000 to 700,000 seeds, each with numerous gynophore hairs that facilitate wind dispersal when dry. (Vaccaro, 2005). *Typha* has parachute seeds that can be dispersed by wind (Baldwin & Cannon, 2007). *Typha* are monoecious, perennial, rhizomatous herbs that reproduce both clonally and through propagule dispersal. They are all obligate wetland indicator species (Bevington, 2007). Cattail plants produce a dense rhizome mat and the clustered leaves produce a thick litter layer (K. Motivans, 1987). *Typha* spreads rapidly via underground rhizomes and can heavily dominate sites with up to 90% cover (Elgersma et al., 2017).

In conclusion, *Typha* is a specie of aquatic plant that is cosmopolitan (found in every continent) except Antarctica. They are highly invasive because of their high rate of growth and spreading mechanism. They have wind dispersal mechanism by producing a large number of seeds and can spread vegetatively through their active rhizome mechanism. Their high rate of invasion and spread make them form a dense monoculture which have implication for biodiversity. In addition, they block waterways and caused siltation. They also provide habitat for some wildlife species. Most parts of the plant are edible and form a large amount of biomass per hectare where it grows in monoculture.

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