# Arthropod communities and succession in baobab, *Adansonia rubrostipa*, fruits in a dry deciduous forest in Kirindy Forest Reserve, Madagascar

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From an insect's perspective, fruits of many plant species are an ephemeral resource such as carrion (Payne 1965; Tabor *et al.* 2004), dung (Koskela 1972; Koskela & Hanski 1977) or rotting wood (Fager 1968): all these systems are relatively small and distinct, consist of organic matter and undergo a clear decomposition process, with several stages of decay (Schoenly & Reid 1987), characterized by specific fauna. Frugivorous insects, particularly Diptera, Coleoptera, Hemiptera and Lepidoptera, frequently invade fruits/seeds during development on maternal plants (*e.g.* Janzen 1969, 1971; Lachaise 1977; Lachaise *et al.* 1982; Fukumoto & Kajimura 2001); fruit invasion and post-dispersal seed predation continues after fruit falls (Winston 1956; Janzen 1969; Lachaise *et al.* 1982; van Klinken & Walter 1996). The sequence of invasions leading to their disintegration might be complex, especially in large fruits. In the only comprehensive study on succession in fruits, Winston (1956) found a wide range of organisms, including fungi, crustaceans, molluscs, arachnids and insects, in decomposing acorns of *Quercus rubra.* He traced several pathways of acorn decomposition, covering the entire sequence from intact nuts to assimilation of shell remains into soil humus. Other studies on invertebrate fruit invasion generally focused on Diptera breeding in fleshy fruits (Lachaise 1977; Lachaise *et al.* 1982; Nunney 1990; Hodge & Arthur 1996; Klinken & Walter 1996), but not on fruits as microcosms, undergoing heterotrophic succession by various organisms with concurrent decomposition, in a manner analogous to carrion or dung.

Not all fruits can support a wide variety of arthropod fruit predators, and vertebrate frugivory often interrupts insect succession (Sallabanks & Courtney 1992; van Klinken & Walter 1996). However, fruits of the Malagasy baobab, *Adansonia rubrostipa* (Jum. & H. Perrier 1909), are capable of hosting diverse invertebrate communities, which may develop largely without disturbance. The large, globose, dry berries develop during the dry season. They are shed towards the beginning of the rainy season, in October–December (Baum 1995, 1996). A firm, woody pericarp up to 5 mm thick protects numerous large (up to 16 × 12 × 8 mm – Baum 1995) seeds in hard seed coats, enveloped in dry, spongy matrix. Both pulp and seeds are of high nutritive value (Osman 2004), which attracts several animal species. Human exploitation of baobab fruits is intensive and relatively well assessed, especially in African *Adansonia digitata* (*e.g.* Baum 1996; Du Puy 1996; Gebauer *et al.* 2002). Less is known about faunal frugivory, and existing observations are limited to vertebrates, with invertebrate fruit invaders only briefly mentioned (Baum 1996; Du Puy 1996). However, in the dry deciduous forest of Kirindy we found a much larger proportion of *A. rubrostipa* fruits damaged by insects than destroyed by vertebrates. Many of these fruits hosted large and diverse arthropod communities, responsible for rapid decomposition of pulp and seeds. Therefore we attempted to survey multi-species invertebrate assemblages in the fruits of *Adansonia rubrostipa* in Kirindy, and describe arthropod succession inside the fruits and their role in fruit decomposition.

The study was carried out in November 2004 at the beginning of the rainy season, in a dry deciduous forest in Reserve Forestière de Kirindy, on the western coast of Madagascar. Data were collected in a PS1 grid system (area: approximately 20 ha), established in unlogged forest west of Deutsch Primate Zentrum field station. The weather was sunny and no precipitation was recorded during the study.

*Adansonia rubrostipa* fruits, dropped in that season, were collected from the ground under the trees throughout the grid system. They were collected over five days from under 42 trees, randomly selected from 72 fruiting baobabs in the PS1 system. If there were fewer than 10 fruits under a particular tree, excluding fragments of fruits destroyed prematurely, or those destroyed

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