NC ZOO

North Carolina Zoological Park Mission
To encourage understanding of and commitment to the conservation of the world's wildlife and wild places through the recognition of the interdependence of people and nature.

NC Zoo Horticulture Department Mission
To advance public awareness of the importance of plants and their role in nature.

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Plants play a significant role in maintaining animal well-being and successful captive breeding

Plants…

- provide climbing and exercise
- browse and eating
- provide tools for interest and mental exercise
- provide home building or nesting
- provide respite or cover
- filtration for water in exhibit pools
- maintain topography and reduce erosion for good footing and stability
- remove CO2 and improve air quality

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Zoo Horticulture isn't about keeping pristine plants….

- Desired animals behaviors are incorporated
- Toxicity of plants is researched, desired vegetation "look" criteria is met
- Carrying capacities, as it pertains to plant management

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…. climbing

grazing….

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…. browsing

bathing….

In the wild, animals use a particular habitat for a period and then move on. This allows plants in the area time to recover. In a captive situation, animals cannot move on. Instead, they use and abuse the same habitat indefinitely. We term this the carrying capacity of the exhibit. This is ***not*** the same as the minimum space criteria set by USDA. Sometimes this means denying the animals access to certain plants or planted areas.

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Methods to meet the carrying capacity goals:

- replanting (living browse)
- adding cut browse to distract from living plants
- best management practices for healthy plants
- mitigation -- reducing number of animals on exhibit or using pasture rotation
- forcing faster plant growth to keep up
- reducing impact time during wet periods or winter time when plants are not growing or are more susceptible to damage
- protecting against rooting or grubbing while not completely excluding the animals from the plant
- temporary protection to allow for the plants to become established

Browse

- Animal Division and Horticulture Division work together to provide browse for animals in their habitats
- Almost all browse used is grown on site
- Browse nurseries and gardens are located throughout the zoo and are available for cutting at any time
- Horticulture staff save leaves or branches pruned from our collection plants in the park that are on the Approved Mammal Browse List and provide them to keepers - usually at a specified location at the Compost Site or in some cases delivered to animal areas

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Horticulture staff provide supplemental browse material

Horticulture staff save pruned plant material and provide it to keepers as long as it is listed as approved browse

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Reward for delivery

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Horticulture staff provide supplemental browse material and stock pile it for keepers

Browse site at Compost Site

Tropical plant material at Aviary

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Cut browse delivered to exhibit holding

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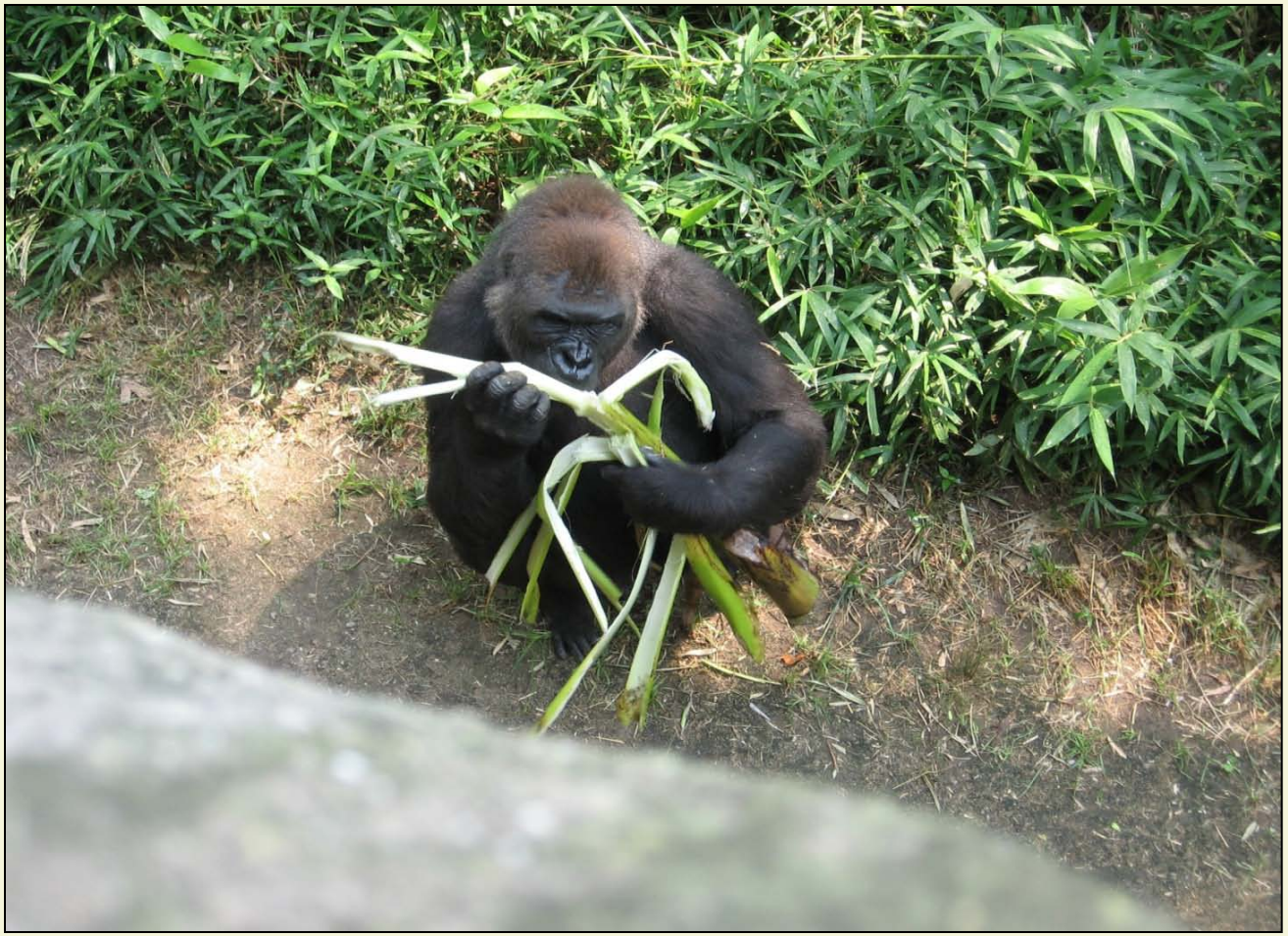
Gorilla browse program- *Aframomum*



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Aframomum

- *Aframomum* is in the Ginger family and all parts are fragrant.
- Seed is widely used as a spice and leaves are used for wrapping and cooking foods.

Aframomum fruit

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Aframomum

In zoos, the absence of *Aframomum* and other African plants in the feed given to Western lowland gorillas may be a factor in an unexplained heart condition many have developed. This has been investigated by Ellen Dierenfeld, staff nutritionist of the St. Louis Zoo, and Melissa Remis, a primatologist at Purdue University.

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Aframomum

Primatologist Michael Huffman – of Kyoto University's Primate Research Institute in Japan – has said that studies have shown Western lowland gorillas in Africa prefer *Aframomum* shoots and seedpods to other foods.

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Aframomum

Mount Cameroon

The North Carolina Zoo obtained known-provenance seed of three species of *Aframomum* from the lowland tropical forests on Mount Cameroon through a partnership with Limbe Botanic Garden, Cameroon

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Aframomum

This imported seed was propagated in our greenhouses and produced plants of the three different species.

Our known provenance *Aframomum* species are maintained as stock plants in greenhouses. Stalks are harvested weekly for the gorillas.

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Aframomum growth habit and flowers spreads rapidly from rhizomes

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Aframomum

Seed of *Aframomum melegueta,* known as Alligator Pepper, was also purchased from a market in Limbe. Seed is ground and used as a spice.

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Aframomum

This seed was also successfully propagated by the zoo and these 28 plants provide browse much of the year.

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Aframomum

Aframomum ready for harvest

New shoots after harvest…

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Aframomum

Growing instructions for *Aframomum*:

- Should be maintained in a greenhouse or high light area with minimum temperature of 55°F
- Keep evenly moist, do not allow it to dry out
- Repot when roots fill the pot
- *Aframomum* spreads by rhizomes and can be divided easily.

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Tooro Botanical Garden

NC Zoo is now partnering with the Tooro Botanical Garden in Uganda on plant conservation projects

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Tooro Botanical Garden

Our focus in Uganda is centered around conserving significant plants in the Albertine Rift. Another goal is to improve our plant collections with species that have plant/animal interactions relevant to our exhibit animals.

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Tooro Botanical Garden

Ensete ventricosum, a plant in the banana family whose fruit is eaten by primates, is the only species that has been imported to date.

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Ensete in our African Pavilion

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Ensete in bloom

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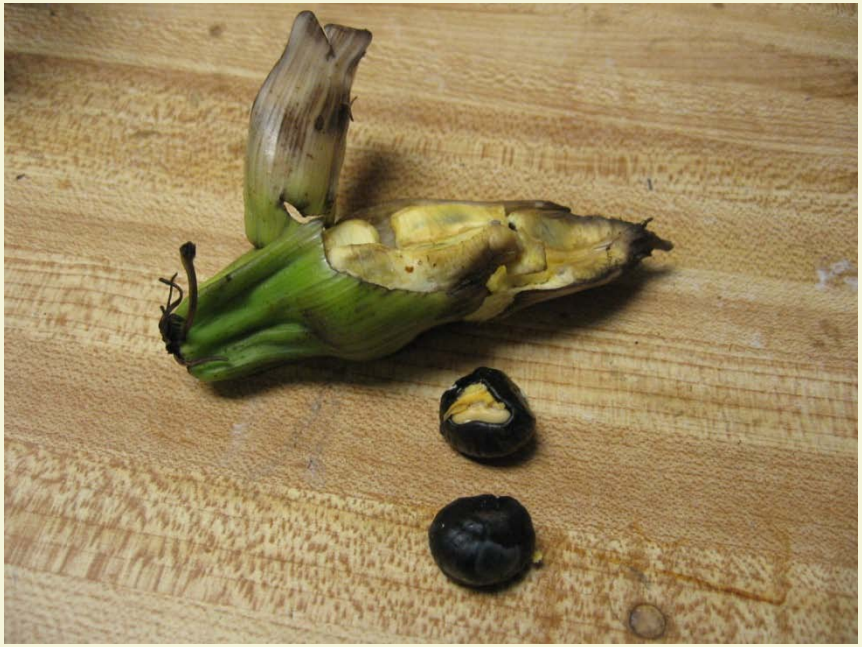
Ensete

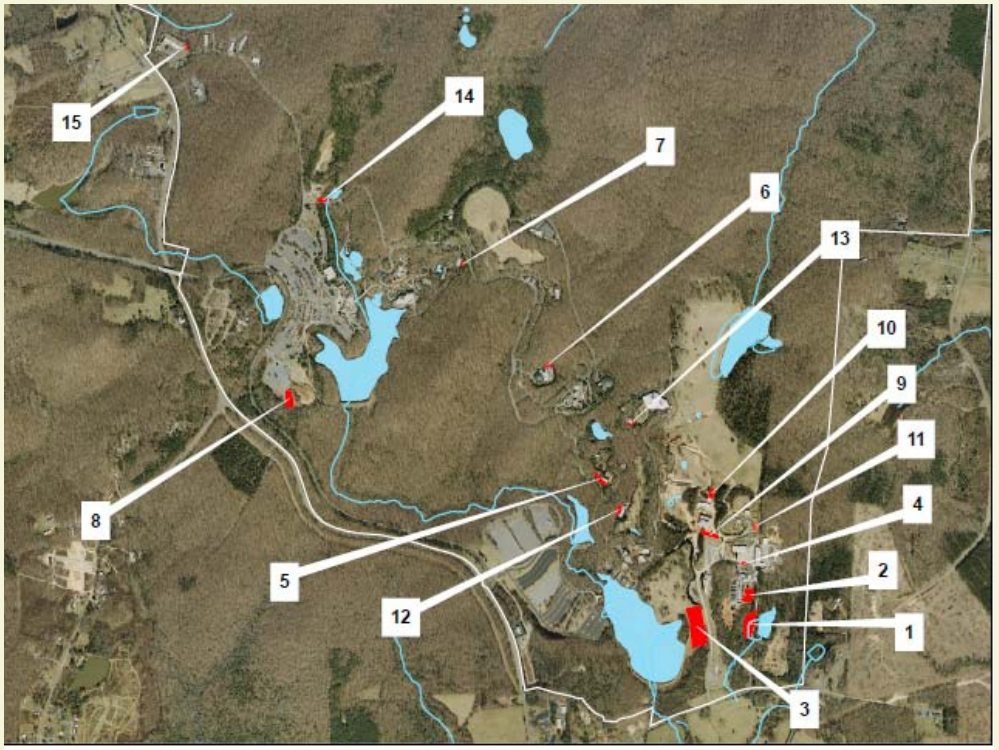


Fruit and seeds from zoo plants

Next generation of plants

Browse Nurseries and Gardens

- Horticulture staff also manage the browse nurseries and gardens on zoo site
- Plant species grown in the browse gardens are selected from the Approved Browse List provided by the veterinarian staff
- When selecting plant species for a browse garden, it is also important to ensure the chosen plants are ***not*** invasive in your region



Browse nurseries and gardens on zoo site

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Partial list of browse materials grown on site around the park

Id	Site	Plants at site	Users	Approx S F
1	Bamboo Browse Area	bamboo-1 mass 2700 sq. ft; Red tip-6; Prickly pear-1 mass 270 sq. ft.	unknown	20471.66
2	Vegetable Browse Garden	vegetables; fruit trees-9; blackberry-6; blueberry-3; asparagus beds-2	commissary	8288.29
3	Tree Browse	Mulberry-174; willow-32	unknown	54,866.89
4	Greenhouse Bamboo	Bamboo-limited quantities	unknown	277.49
5	Chimp Service	Bamboo	chimp keepers	1706.74
6	Desert Service	Herbs	desert cat keepers	272.56
7	Streamside Service	vegetables; kiwi	streamside keepers	141.03
8	NA overflow Parking	eleagnus-55; mulberry-4	unknown	8826.03
9	Elephant Service Area	eleagnus-100; wax myrtle-100	elephant keepers	2537.40
10	Elephant Service Area 2	not developed yet	elephant keepers	1998.34
11	Plains Barn	annual vegetables	plains keepers	357.48
13	Forest Glade	annual vegetables	gorilla keepers	163.69
14	Sediment Pond Fence	honeysuckle	unknown	1,740.68
15	Vet Hospital	annual vegetables	wildlife rehab	232.88
12	ZOG Service Area	Redtips-6	ZOG keepers	854.39

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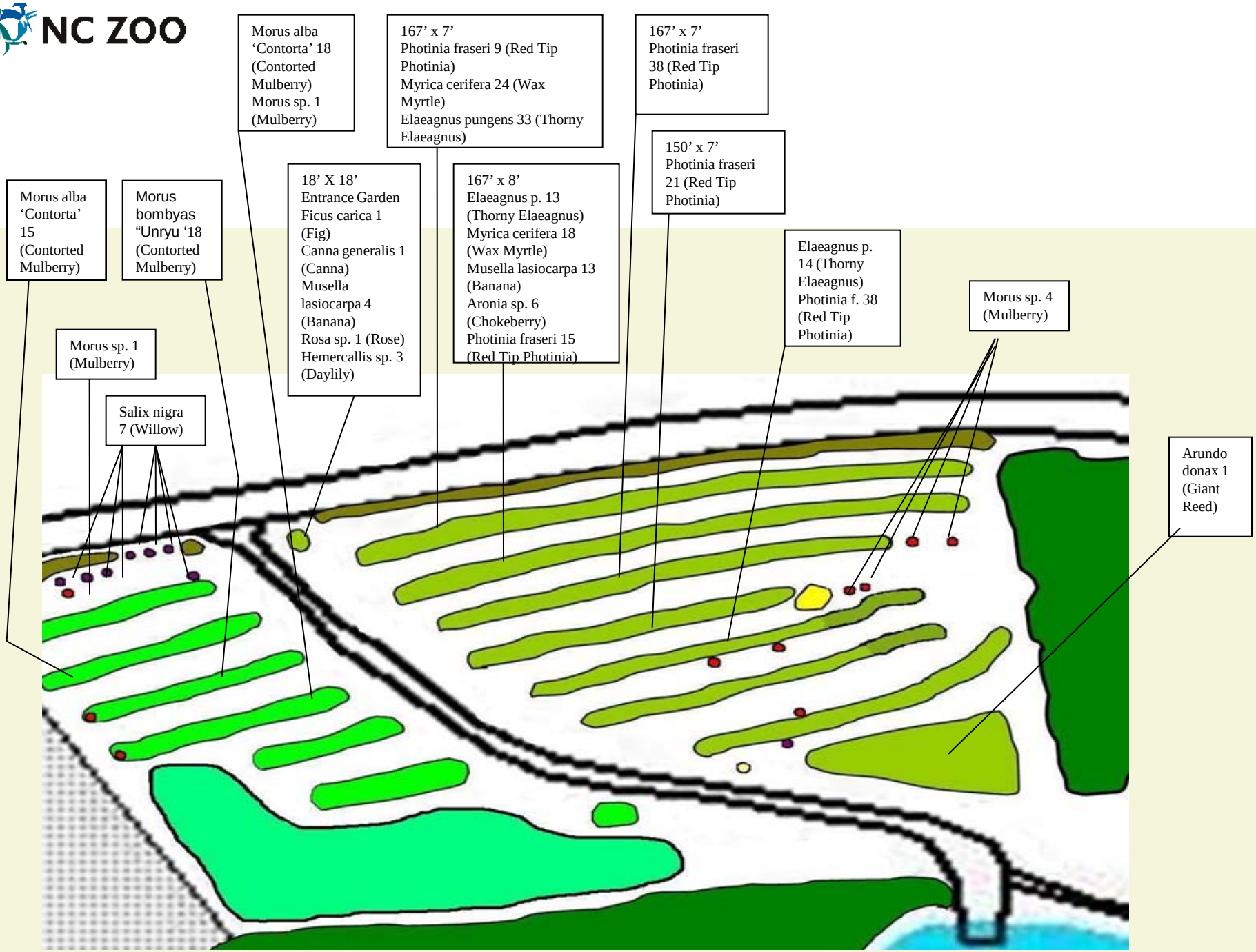
Cori’s Garden


Morus alba 'Contorta' 18 (Contorted Mulberry) Morus sp. 1 (Mulberry)
167' x 7' Photinia fraseri 9 (Red Tip Photinia) Myrica cerifera 24 (Wax Myrtle) Elaeagnus pungens 33 (Thorny Elaeagnus)
167' x 7' Photinia fraseri 38 (Red Tip Photinia)
Morus alba 'Contorta' 15 (Contorted Mulberry)
Morus bombyas "Unryu '18 (Contorted Mulberry)
18' X 18' Entrance Garden Ficus carica 1 (Fig) Canna generalis 1 (Canna) Musella lasiocarpa 4 (Banana) Rosa sp. 1 (Rose) Hemercallis sp. 3 (Daylily)
167' x 8' Elaeagnus p. 13 (Thorny Elaeagnus) Myrica cerifera 18 (Wax Myrtle) Musella lasiocarpa 13 (Banana) Aronia sp. 6 (Chokeberry) Photinia fraseri 15 (Red Tip Photinia)
150' x 7' Photinia fraseri 21 (Red Tip Photinia)
Elaeagnus p. 14 (Thorny Elaeagnus) Photinia f. 38 (Red Tip Photinia)
Morus sp. 4 (Mulberry)
Morus sp. 1 (Mulberry)
Salix nigra 7 (Willow)
Arundo donax 1 (Giant Reed)

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Getting it right from the start

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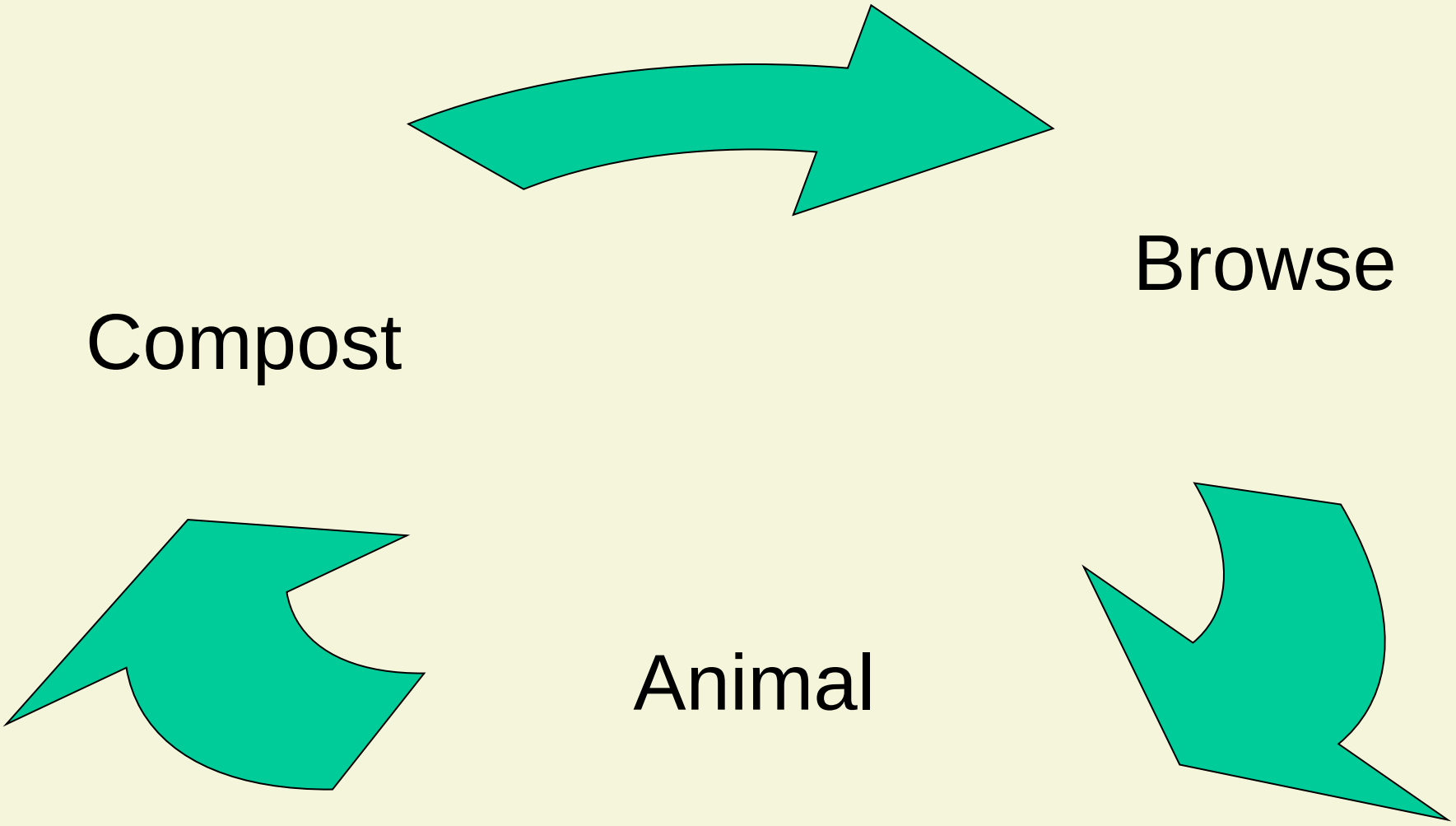
Browse begins here

Cycle of sustainability and enrichment



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Leaves from the City

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After a winters harvest

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Red Tipped Photinia

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Field grown bananas

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Banana

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Experimental plot of *Aframomum* outside

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Newly established *Aframomum*

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Arundo donax

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Liquidamber styraciflua

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Elaeagnus pungens

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Black Willow - *Salix nigra*

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Common Fig - *Ficus carica*

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Banana - *Musella lasiocarpa*

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White Mulberry - *Morus alba*

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Morus bombyas "Unryu"

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Wax Myrtle - *Myrica cerifera*

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Chindo Sweet Viburnum
Viburnum "Awabuki Chindo"

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Bamboo

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Exhibit Plantings

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