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### Stranded Tropical Seeds and Fruits Collected from Carolina Beaches

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#### Abstract

Twenty-two tropical stranded seeds and fruits brought to Carolina beaches by the Gulf Stream are listed and the collection sites mapped. The occurrences of these stranded seeds and fruits are correlated with ocean storms which have strong on-shore winds.

Common Caribbean seeds and fruits brought by the Gulf Stream to the eastern beaches of Florida have been described and illustrated by Gunn (1968). The main areas of deposition of these disseminules in the United States are the beaches south of Titusville Beach, Florida. North of this point the Gulf Stream veers out to sea; therefore, fewer of these disseminules are washed ashore in northern Florida and northward. While their occurrences on beaches in Ireland, Scotland and islands north of Scotland, Norway, and Holland (all served by arms of the Gulf Stream) have been discussed by Gunn (1968), Guppy (1917), and Leenhouts (1968), their occurrences (albeit infrequent) along the coast of South and North Carolina have not been recorded. Records included in this survey represent northernmost United States limits of

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tropical disseminules. The Carolina collections were made between 1968 and 1970 by John Dennis, except for the Bogue Banks collections which were made by Jan Kohlmeyer, Institute of Marine Sciences, Morehead City, North Carolina.

#### COLLECTING SITES

The Carolina collecting sites are shown in Fig. 1. The two main sites in South Carolina were in Georgetown County, between North Island and Murrells Inlet, and in Horry County at Myrtle Beach. The North Carolina sites were in Onslow County at Bogue Banks in the vicinity of Atlantic Beach and Salter Path; Cape Lookout, Carteret County; and Cape Hatteras, Dare County.

The northernmost United States record for a stranded tropical disseminule is not from North Carolina. Rather, it is Nantucket Island and Martha's Vineyard Island, Massachusetts. John Dennis obtained a single sea heart, *Entada gigas* (Fig. 2 I-K), from a Nantucket beach. Another

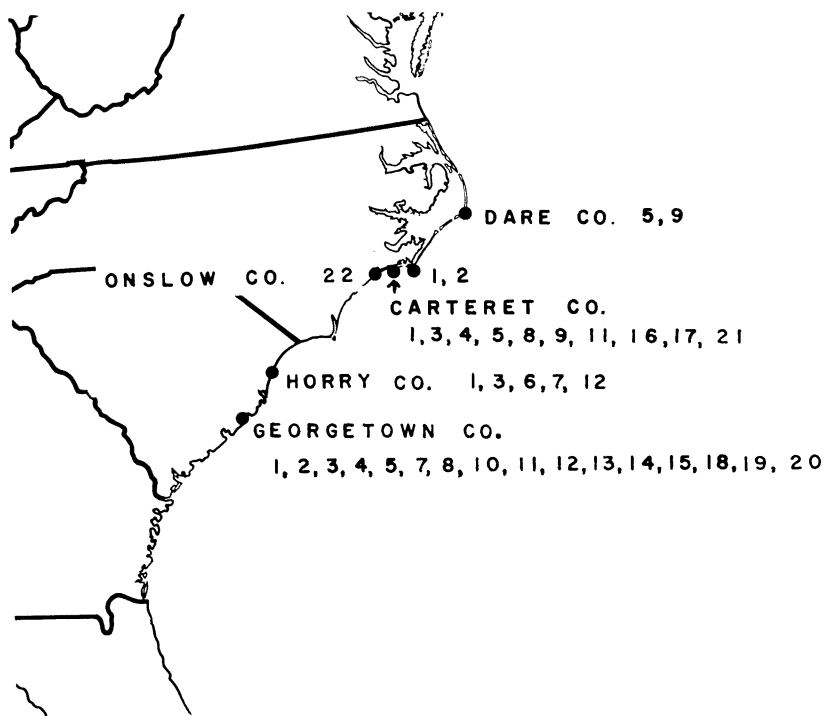


Fig. 1. Six collecting sites along the Carolina coast are shown with the code number representing the collected disseminules. See text to convert the numbers into names.

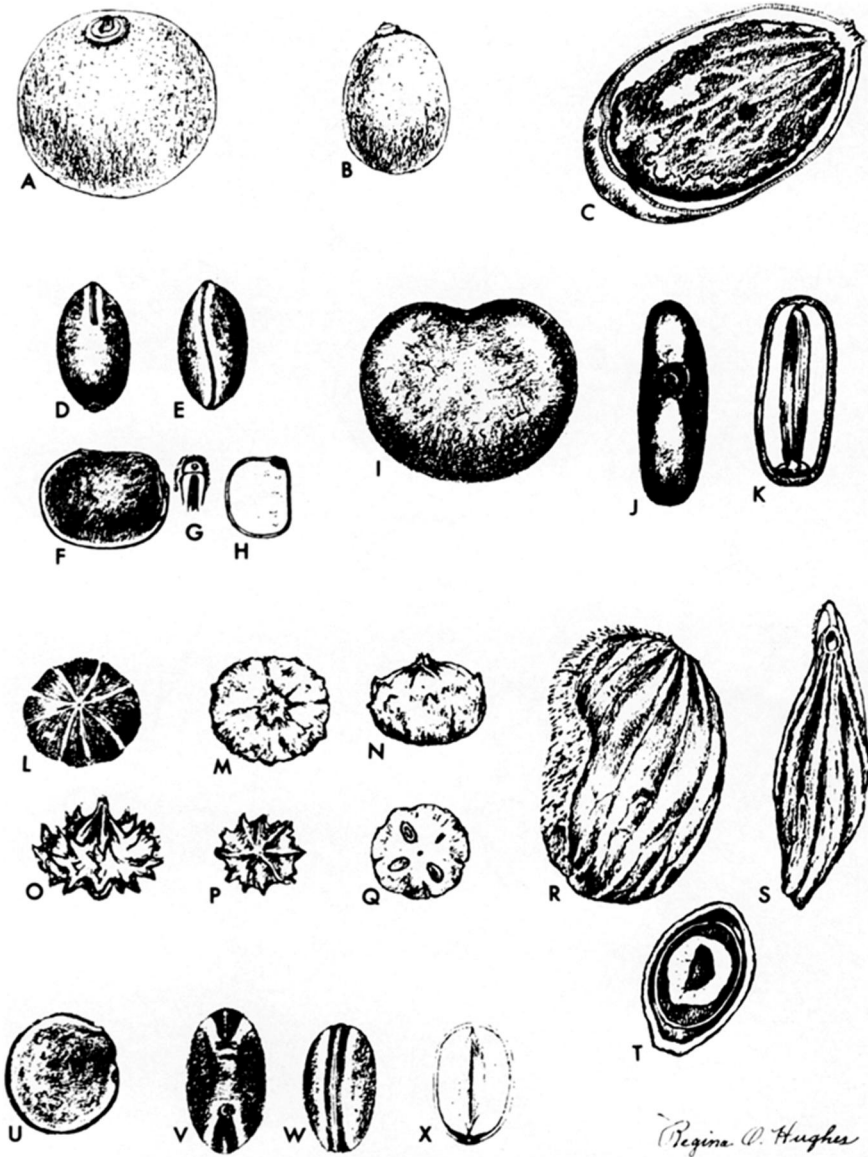


Fig. 2. Selection of tropical drift seeds and fruits from the Carolina coast. *Crescentia cujete* L., A-C; *Dioclea reflexa* Hook. f., D-H; *Entada gigas* (L.) Fawcett & Rendle, I-K; *Hippomane mancinella* L., L-Q; *Mangifera indica* L., R-T; *Mucuna urens* (L.) Medicus, U-X. A-B, entire fruits; C, fruit cut open (x0.25); D-E, seed, lateral view; F, seed, face view; G, micropyle; H, seed, cross section; I, seed, face view; J, seed, lateral view; K, seed, cross section; L, entire fruit; M-N, fruits with exocarp absent; O-P, eroded fruits; Q, fruit, cross section; R, endocarp, face view; S, endocarp, lateral view; T, endocarp, cross section; U, seed, face view; V-W, seeds, lateral view; X, seed, cross section (x0.5).

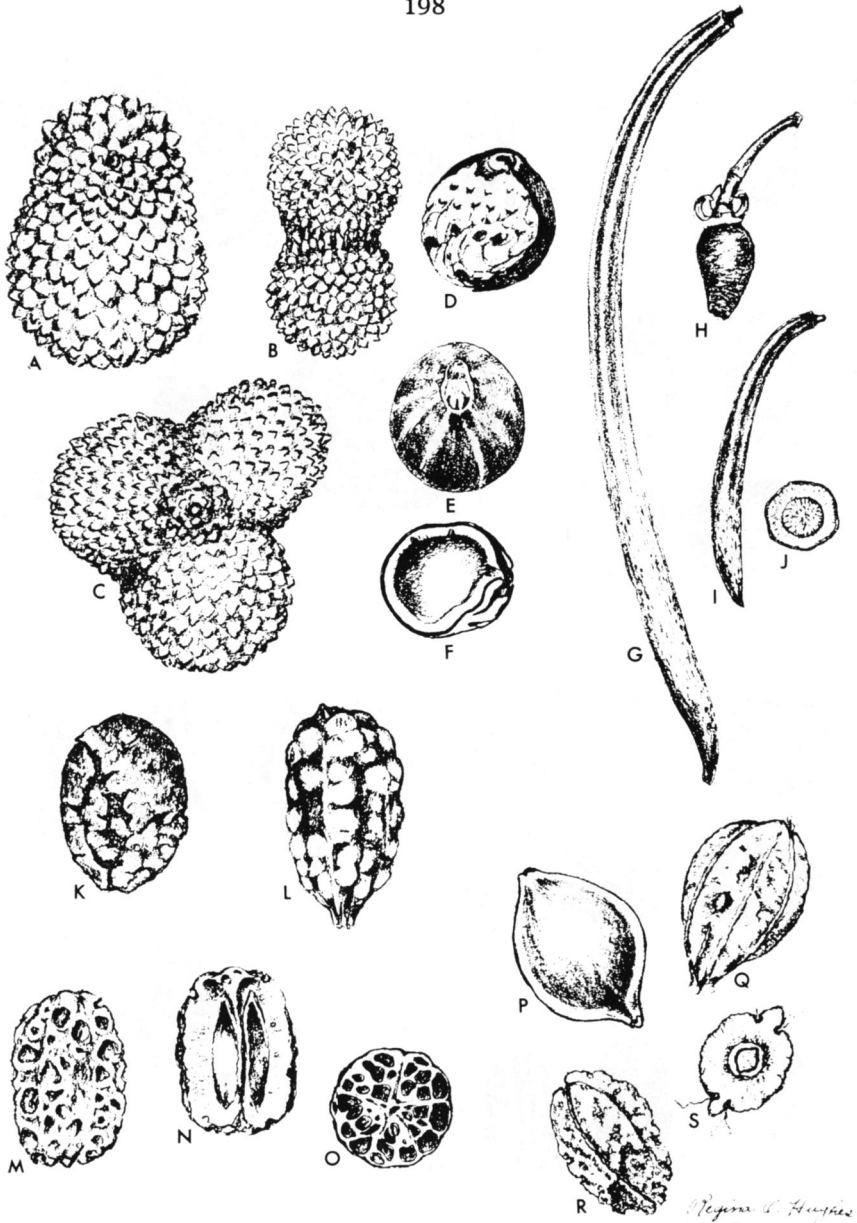


Fig. 3. Selection of tropical drift fruits and seedlings from the Carolina coast. *Manicaria saccifera* Gaertn., A-F; *Rhizophora mangle*, G-H; *Sacoglottis amazonica* Mart., K-O; *Terminalia catappa* L., P-S. A, 1-seeded fruit; B, 2-seeded fruit; C, 3-seeded fruit; D, eroded endocarp; E, intact endocarp; F, endocarp, cross section; G, average size seedling; H, fruit; I, small seedling; J, seedling, cross section; K, entire fruit; L, fruit, exocarp missing; M, eroded fruit; N, fruit, longitudinal section; O, fruit, cross section; P, entire fruit; Q, fruit, exocarp missing; R, eroded fruit; S, fruit, cross section (x0.5).

collection made more than fifteen years ago on a Martha's Vineyard beach by Hollis Engley was a *Hymenaea courbaril* legume which contained a viable seed. He planted the seed and now has an attractive "Bonsai" tree. Finding a tropical seed in the environs of Cape Cod is indeed a once in a lifetime discovery. On the other hand the Carolina sites yield tropical seeds and fruits every year, especially after sea storms with onshore winds.

Listed below in decreasing order of abundance are the 22 identified tropical disseminules collected from Carolina beaches. The number preceding each entry may be used to locate the beaches or beach in Fig. 1 where the disseminule was collected. Species numbered from 12 to 22 are represented by only one or two specimens. One unknown is not listed. Ten of the disseminules are illustrated in Fig. 2 and 3.

1. *Terminalia catappa* L., Indian almond (Fig. 3, P-S)
2. *Spondias mombin* L., hog-plum
3. *Mucuna urens* (L.) Medicus, sea bean (Fig. 2, U-X)
4. *Cocos nucifera* L., coconut
5. *Entada gigas* (L.) Fawcett & Rendle, sea heart (Fig. 2, I-K)
6. *Elaeis guineensis* Jacq., oil palm
7. *Caesalpinia crista* L., nickernut
8. *Manicaria saccifera* Gaertn., sleeve palm (Fig. 3, A-F)
9. *Rhizophora mangle* L., red mangrove (Fig. 3, G-H)
10. *Hippomane mancinella* L., manchineel (Fig. 2, L-Q)
11. *Sacoglottis amazonica* Mart. (Fig. 3, K-O)
12. *Acrocomia* sp. (tentative identification)
13. *Caryocar microcarpum* Ducke, butternut
14. *Dioclea reflexa* Hook. f., sea-purse (Fig. 2, D-H)
15. *Crescentia cujete* L., calabash-tree (Fig. 2, A-C)
16. *Calophyllum calaba* L., laurelwood
17. *Omphalea diandra* L., Jamaican navel spurge
18. *Sapindus saponaria* L., soapberry
19. *Pterocarpus officinalis* Jacq., bloodwood
20. *Hymenaea courbaril* L., West India locust-tree
21. *Carapa guianensis* Aubl., crabwood
22. *Mangifera indica* L., mango (Fig. 2, R-T)

#### DISCUSSION

Several of the disseminules were encrusted with marine organisms when they were collected, suggesting that these disseminules were in the ocean water for some time. For a discussion of marine fungi found on red mangrove (*Rhizophora mangle*, Fig. 3, G-H) seedlings, see Gunn and Dennis (1971).

We estimate that it takes from two to three months for disseminules to float from the Caribbean region to the latitude of the Carolinas. Only one collection was actually made from the ocean floor. The mango, *Mangifera indica* Fig. 2, R-T), was dredged from the ocean bottom at Bogue Banks by a scallop fisherman. The others were beached when collected.

Stranded disseminules were not found on each trip along the beaches. Several were usually found at a time, and these in recently deposited ocean debris. Because the Gulf Stream is some distance offshore along the Carolina coast, there is little, if any, chance of these disseminules being washed ashore except under the influence of strong onshore winds. Our field observations indicate that a strong onshore wind precedes the stranding of tropical disseminules.

We do not imply that stranded disseminules are restricted to the beaches in Fig. 1. Other Carolina beaches may receive disseminules, and we hope that this article will encourage others to seek them out.

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### An Annotated Checklist of *Carex* (Cyperaceae) in Georgia

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This study originated as part of a doctoral dissertation to be presented at the University of Georgia. Before it was completed, the senior author moved to Rhodesia and changed research objectives. However, the information that had been gathered and compiled from studies of specimens and literature is valuable. Much of it is presented here.

For each species listed, alternative names are given as they appear in certain manuals. No attempt has been made to compile an exhaustive synonymy for each species, or to determine which are prior and valid names. Certain taxa are treated by some authors as species and by