SPATHE IN ARECANUT

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Introduction

It is well known that plants in general protect the young floral parts from the attack of animals, scorching sun, heavy rains, parasitic fungi and insect pests in many ways by modified plant parts among which, the spathe, which is only a modified bract, plays an important part.

The spathe in many plants does many functions. It is defensive in some aroids eg. Amorphophallus bulbifer (devils spittoon), the inflorescence protected by spathe coming out of the ground gives an appearance of hood of snakes with the effect that herbivorous animals mistake them for snakes and leave them untouched. In another aroid known as snake plant (Arisaema) the spathe has a greenish-purple colour and it expands over the spadix like the hood of a cobra.

Besides the above mimicry, the spathe functions as an insect attractive organism when it becomes petaloid for effecting pollination, eg. Poinsettia.

"Bracts are special leaves from the axil of which a solitary flower or a cluster of flower arises" (Dutta). There are great variations in size, shape and duration of bract in many plants for satisfying different functions allotted to them. When protective it develops into much enlarged organ and encloses the inflorescence. When attractive it becomes brightly coloured and attracts insects for pollination.

According to the size, colour and arrangement, the bracts are classified into the following different groups,

1. Leafy bracts	eg.	Gynandropsis.
2. Scaly bracts	..	Sunflower
3. Spathe	..	Palms in general, banana, aroids etc.
4 Petaloid	..	Poinsettia.
5. Involucre	..	Sunflower, Ipomea pi'eata (boat shaped.)
6. Epicalyx	..	China rose, cotton.
7. Glumes	..	Grasses.

Description

In arecanut palm the inflorescence produced in the axils of leaves are well protected under the leaf sheaths which encircles the palm. The inflorescence is a spadix completely covered up in a flat boat shaped leathery spathe the modified bract. After the leaf fall the spadix is exposed and when the floral parts become mature the expanding floral parts break open through the spathe. The colour of the spathe when under the leaf sheath is white or pale-white devoid of chlorophyll.

The spathe in arecanut is made up in such a way as to protect the floral buds from bad weather, from animals, insect pests and parasitic fungi until its emergence.

It is very much interesting to note the make-up of the spathe, which is generally a boat-shaped flattened body varying in size and shape in each palm, tough and leathery in texture. (Fig. 1.) The outer

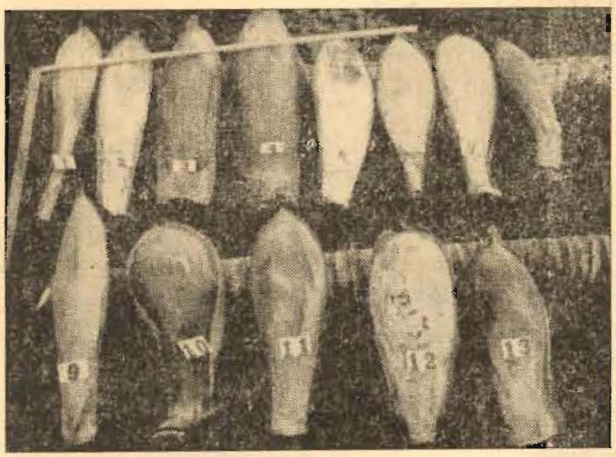


Fig 1

side of the spathe, is thicker than the inner side. There is a pseudo-line in the centre through which the floral parts break through in the case of normal opening. The outer surface of the spathe turns green when exposed.

The colour of the spathe, which will be light yellow or pale-white for some days, gradually turns green, which in turn helps manufacturing food substances by photosynthesis. The inner surface of the spathe is always pale white in colour and smooth. It is water proof. It is like a jacket completely covering the inflorescence with the broader part seen always either at the top or in the middle portion, with thick edges on eithersides, half to one inch in breadth, converging at the top and tapering outwards like the blade of a knife. It is seen that these thick margins remain green even after the leaf fall, the sides already been dried well in advance. The basal part is not strong or thick and pasted to the base of the peduncle attached to the palm. Always this basal part of the spathe is narrow. A cross section of the spathe is oval in shape. The upper tip of the spathe is either pointed or board.

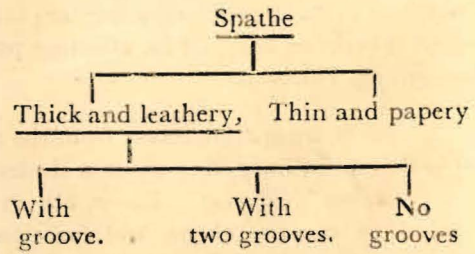
There are spathes with the thickness of a paper occurring in some palms. This denotes a distinct type difference.

There are three distinct types of spathes produced by different areca palms.

1. Spathe having a groove about a centimeter deep formed by the outer side, about half to one inch below the extreme border, starting from the base and extending upwards. Normally this line is seen on the right side of the spathe. (Fig. 2 Spathe No. 1)

2. Spathe having 2 grooves described as above on either sides starting from the base and converging at the top. Sometimes these lines are localised to the central portion (Fig. 2 Spathes No. 2 and 5).

3. Spathe having no grooves at all (Fig 2. Spathes 3 & 4).



Generally the spathes in arecanut palms vary widly in shape. The most common shape is like the hood of a cobra, (Fig. 1).

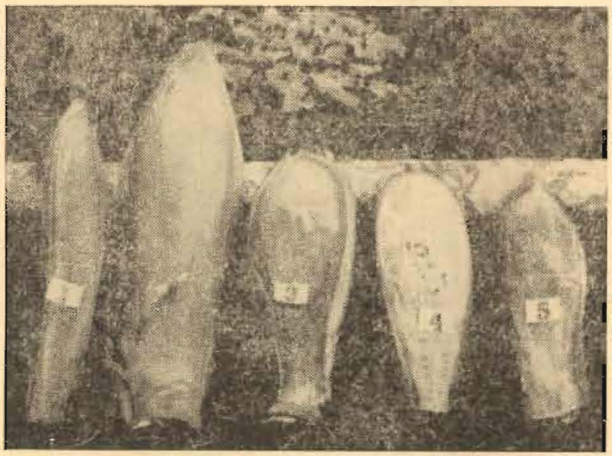


Fig. No 2

The number of spadices produced will depend upon the number of leaves produced by a palm. Normally in every leaf axil there will be a spadix If in any leaf axil the spadix is not seen developed it is only due to the abortion of the spadix in the early stages of development. By dissecting a crown, spadices of various stages of development are noted in all the leaf axils upto 13 in number. If the mean annual leaf fall is taken as 6 it can be seen that the spadices are produced even before 2 years of their emergence (Moorthy and Bavappa —1960).

The size and shape of the spathe varies in palm according to the size of the inflorescence produced.(Fig·1) Spathe with a maximum length of a meter and breadth 58 cms has been recorded in healthy palms.

The position occupied by the spathe soon after the leaf fall, is seen standing erect or more or less parallel to the stem. (Fig. 3)· As the floral parts become

Fig. No. 3

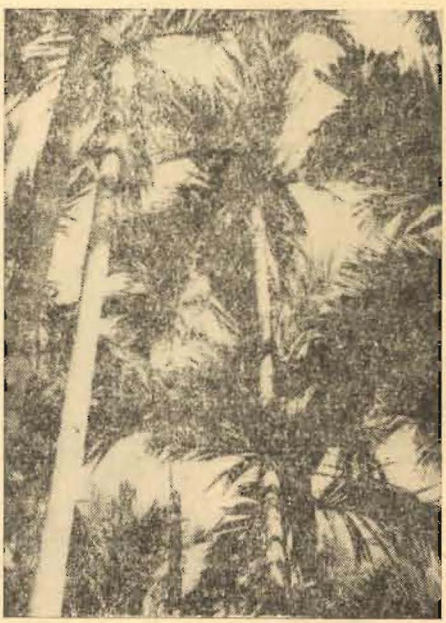


Fig. No 4

enlarged, the total weight and volume of of floral parts accommodated by the spathe naturally become increased and because of it, the spathe, standing erect, gradually moves away from the stem upto 90 degrees or even more. (Fig. 4).

In some palms the inflorescence is seen either occupying a position at 90 degrees or more, or parallel to the ground, soon after the leaf fall. This may be a genetical factor or falling away of leaf sheath before the inflorescence becomes mature or due to abnormal weight of the floral parts occupying the top portion of the spathe. (Fig. 5).

In some palms, the spathes produced are as long as the leaf sheath or even more, (Figs. 3 & 4), while in some others the length is only half, one fourth or even less (Fig. 6 & 7). Type difference plays an important part in this. Other physiological disorders also cause underdevelopment of spadices.

Fig No 5

Normally it is noted that as a rule the length of the spathe is increased, the breadth decreased and vice versa. However this does not affect the original shape of the spathe in each palm.

Fig No 6

The earlier spadices produced are some times smaller and different in shape. In the peak season of the production of spadices the size is seen the biggest. On examination of the spathes produced regularly by a palm we can see slight variations in size. The shape is kept almost constant in middle aged and old palms while in young palms many underdeveloped spadices may be produced and may deviate from the above rule. (Fig. 8). Some spadices produced by young palms are seen semicircular or tubular in shape. (Fig. 8). The production of the spathe in areca palms, in general, are in regular succession either alternate or triangular.

Fig No 7

Opening of the Spathe.

The mechanism of opening of the spathe is an interesting item of study in the floral development in areca palms. The tender floral bud is loosely packed in the leathery spathe As the floral buds grow the spathe also grows simultaneously to accommodate the growing floral parts. After the leaf fall the spadix is seen attached to the palms unopened upto 2 months in young palms and more than a month in medium aged palms and about a month in old palms, meanwhile the floral development taking place inside the sealed jacket called spathe. In some cases the spathe is seen thrown out by the floral parts within 24 hours of its emergence from the leaf sheath. As the floral parts develop and become mature and ready for opening, the growth of the spathe is seen almost arrested, the female and male flower stalks which are well packed together parllel to the penduncle, longitudinally, fills in the interspaces left, if any, in the spathe. The pressure inside the spathe is thus increased. The fast growing female flowers, which are seen as round global bodies protruding outwards on the outer side of the spathe also exerts pressure on the spathe, and because the growth of the spadix becomes almost arrested by that time it somehow or other accommodates the female flowers by expanding outwards, as far as possible, and because of this expansion the protruberances are clearly manifested on the other side of the spathe. Examination of the fallen spathe or spathe ready to split will reveal this. As the thinner-most part of the spathe is the inner-side facing the palms or the substanding leaf, that part on the inner side, opposite to the part where the pressure exerted mainly by the

Fig. No. 8

fast growing female flowers towards the outer side, easily succumbs and a longitudinal split through the pseudoline, mentioned earlier, takes place instantaneously in normal cases. As the basal part of the jacket like spathe is thin, where it is pasted to the base of the peduncle, the rupture first starts from the basal part on the inner side.

The position of the spathe in many palms is that at the time of opening, the spadix stands at an angle between 30 to 60 degrees away from the stem slantingly. (Fig. 9 & 10). This enables the inflorescence to push out the spathe as soon as the split occurs. The split being always longitudinal and extends about 2 inches below, the apex of the spathe widens and because of its weight and the push exerted by the floral parts it almost hangs on the inflorescence and falls down if no obstacle is present. (Fig. 9). The wind also helps falling away of the spathe hanging without any grip after its opening. In some palms the spathes are seen standing erect parallel to the stem. Then falling of the spathe is not instant. It may take few hours to many days to effect falling since even after the splitting takes place, the one side opened jacket remains attached to the flower stalks because it is standing erect and clings like a clip. The expanding floral parts with the help of winds throws out the spathe.

Fig No. 9.

Irregularities noted in opening

An examination of the mechanism of the rupturing of the spathe in normal cases reveals that the splitting first starts at the basal part of the spathe and spreads rapidly upto the top along the pseudoline longitunally on the inner side, meanwhile the expanding floral parts push away the spathe and freeing itself. The spathe falls down at once.(Fig.9). Sometimes the pressure exerted by the female flowers may cause splitting of the spathe at the base on the opposite side i. e. the outer side where the protruberance are formed. In this case the split only gradually spreads on to the top or apex spathe and so the falling away of the spathe is delayed. The spathes were seen attached to the top of the inflorescence for more than a month and this causes unequal distribution of sunlight and air to the floral parts. (Fig. 10). Some of the flower stalks may even cling to the inner side of the spathe till its falling which causes irregular maturity of flowers.

Splitting through one side of the spathe in rare cases is also seen. Some times the spathe is seen constricted and irregularly developed and bent at the base. In this case also great difficulty is confronted by the inflorescence in throwing out the spathe (Fig 6). The spathe in many cases seen

clinged together with the flower stalks and in rare cases harbours insect pests also. The growth of the infloreseence may be more rapid when compared to the growth of the spathe in some cases, when the floral parts may break open the same and come out immature.

There are spathes which attach to the plant for months together unopened

Fig No. 10

with the floral parts inside until decayed and disintegrated. This is seen due to the attack of some lepidopterous larvae of some moths boring through the thinner parts of the spathe in tender ages and destroy the inflorescence.

In Coconut Palm

It is interesting to note that in coconut palm the inflorescence is protected by two sheaths (spathes) in the early stages of development. The outer sheath is thick and fibrous while the inner one is more yellow and often fibrous and somewhat flat in nature. The outer sheath stops growing very early in the life of the inner spathe so that the the latter punctures it with its hard point on its ventral side (ie. the side towards the subtending leaf) and comes out erect as a yellow, somewhat flattened cone which later on, as it grows turns green, curves a little outwards and becomes more rounded than flat. In course of time, when the spadix is full grown it becomes more cylindrical especially in the upper half and the distension of the inflorescence within causes great pressure on the walls of the spathe with the result that it ruptures longitudinally on the ventral side at a point about an inch and a half from the apex and extends down along a groove, and the inflorescence eventually emerges out of the spathe. Some times the rupturing of the spathe takes place on its dorsal side when the spadix turns round till the inflorescence within opens out. The process of splitting is very slow starting from the apex, it takes about 24 or more hours to complete" Page 44 - The Coconut palm—A Monograph by Menon and Pandalai.

From this description we can see considerable difference in the structure and shape of the spadix and the mode of opening of the spathe between arecanut and coconut. Sometimes, in arecanut, spathe resembling the coconut spathe occur, though not woody and fibrous.

To Cultivators

Rare instances of eating away of the spathe by squirrels at immature stage and thus exposing out the tender floral parts is noted. Also instances of attack by scale

insects and larvae of some lepidopterous moths boring through the spathe and destroying the inflorescence noted. Instances of boring by weevils have also come across. The part where it is attacked by insects can be seen as small holes on the outer surface of the spathes and sometimes with oozing fluids from the base of the spadix. In this case, careful observation of spadices are required, and, if any insect pests are noted, destruction of the same is needed. If any delay in falling away of the spathe is noted, removal of the spathe is advised so that the attachment of the spathes to the inflorecence and obstructing the growth can be prevented; the possibility of getting all the female flowers cross pollinated is also increased and naturally a good harvest can be expected.

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