

MORPHOLOGICAL STUDIES OF OLIVE TREE. I

(1) On the Differentiation of the Flower-bud and
Development of the Floral Organ.

By

Kimijiro NORO

and

Takahiro and INOUE

(Laboratory of Sub-tropical Horticulture)

INTRODUCTION

The time of flower-bud differentiation is studied by SAVASTANO⁽¹⁾ in Italy, KING⁽⁴⁾ and HARTMANN⁽²⁾ in California U.S.A. Almost all investigators found that first evidence of floral primordia occurred in about 8 weeks before the flowers blossom at every locality. Results investigated at every locality in California by HARTMANN⁽¹⁾⁽²⁾ are shown in table 1.

Table 1

Approximate date of first evidence of sepal primordia and of full bloom for Mission olive variety at four localities in California. (1946)

Locality	Initiation of sepal primordia	Full bloom
Riverside	March 18	May 6
Lindsay	March 12	May 10
Corning	March 18	May 18
Davis	March 27	May 21

King⁽⁵⁾ reported precisely the development of the floral organ of Mission olive (*Olea europaeae* L.)

Writers investigated the time of flower-bud differentiation and the floral organ development since 1950.

FLOWER HABIT.

BLOOMING DATE. All the olive varieties blossom at nearly the same time. But the time of blooming is different in various parts of the world. The range of full bloom is from May 25 to June 5 mostly every year in Japan. The period of blooming is about one week and the investigator must know the blooming period.

FLOWER HABIT. Flower habit of olive is little different from that of Satsuma orange (*Citrus unshiu* Marcovitch). The panicle inflorescence of the olive arises in the axil of each of the oppositely arranged leaves of a stout branch which started in last spring. (Fig. 1.) The fruit is normally borne singly-rarely in two or three on long peduncles. Exceptionally the inflorescence starts from the bearing shoot produced on the branches which started in last spring. Writers saw in this summer the peculiar fruit which was very small and flat, and grew in cluster from 6 to 10 fruits as the grape. (Fig. 2.) Writers think that it was so-called "Passerine" olive produced by the parthenocarpic.⁽⁶⁾

FLS. Small, white or whitish, the short calyx 4-toothed, Short-tubed corolla with 4-rarely 5-valvate lobes, the stamens 2; ovary 2-loculed, bearing a short style and capitate stigma; shapes of stigma are classified into 5 groups in varieties by RUBY⁽¹⁰⁾. Olive flowers may be either perfect or staminate flowers with an abortive pistile. The cause of the stamiferous flower is investigated by PETRI⁽⁸⁾, HARTMANN⁽³⁾ and NORO⁽⁷⁾ and almost the same results are obtained. It is originated in the physiological conditions.

The order of flowering is not definite and the flower-bud at the apex never first opens, we

think. The order of flowering will be recognized by the color of the flower-bud.

MATERIAL AND METHOD

MATERIAL USED. Bud samples were gathered from every part of the Mission variety about 20 years old tree at the garden of our college during 1950 and 1951 at 2 weeks intervals from July to February and at one week intervals afterward and were placed immediately in vials containing formalin-alcohol solution.

The buds were prepared for sectioning by treatment with the usual alcohol-xylol-paraffin series. Sections cut by 10-15 μ in thickness were stained with cotton blue or methyl blue.

At the same time, the strip method always used by Dr. Eguchi was adapted.

OBJECT IN VIEW OF RESEARCH. In our studies great stress was laid upon the differentiation of the inflorescence and floral organ. According to HARTMANN's opinion⁽⁵⁾ we determined that the date of initiation of the flower-bud was given when sepal primordia was first found. As it was very difficult to determine the time of differentiation of the inflorescence, we adapted as the date of initiation the time when the terminal bud differentiated into three flower-buds.

RESULTS

Writers found the buds at the 2nd leaf-axil in the late summer and it seemed to us that it was "neuter" bud called by SAVASTANO⁽¹⁰⁾. Writers did not find any changes on the apical part of the terminal bud till April 4, 1951, and on April 11 the longitudinal sections of the growing point of the bud showed broadening of the tip into rough conical mass, with bract primordia arising as slight protuberances at the outer edge of the meristematic cone, and the vascular tissue was seen at the slight protuberances. (Fig. 3)

On April 18 writers found that the growing point of the bud showed broadening on the tip into more rough flattened mass, with the three flower-bud primordia arising as the slight protuberances at inner part of the bracts.

On April 25, 1951 the differentiation of the inflorescence finished and writers could observe sepal primordia at the outer edge of the terminal bud, namely the differentiation of the inflorescence and floral organ were recognized at almost the same time.

At Hiraimachi, Kagawaken, the time of differentiation of the floral organ was April 25, 1951 and we found it April 17, in 1950, and the full bloom in 1951 was June 3; in 1950 May 28.

The results for 1950 and 1951 are summarized in table 2.

Table 2

Approximate dates of first evidence of sepal primordia and of full bloom of Mission variety in 1950 and 1951 at Hiraimachi, Kagawaken.

1950		1951	
Initiation of sepal primordia	Full bloom	Initiation of sepal Primordia	Full bloom
April 17	May 28	April 25	June 3

called this stage the date of pre-initiation of the inflorescence. (1951)

April 18. The terminal bud was divided into 3 flowerbuds. Sepal primordia at the same time arised as the slight protuberances. Namely, these two stage were the time of initiation of the inflorescence and floral organ.

April 25. In this stage, writer saw petal primordia in the inner part of the sepal.

A CASE ADAPTED THE STRIP METHOD.

April 4. The differences between the leaf and flowerbud were not recognized.

April 11. The terminal bud flattened showed bract primordia arising at the outer edge, and in the inner part of the bract rough parts were seen. Writers

ON AND AFTER APRIL 25,

Each stage by sectioning was shown by the figures and we obtained the same results as KING⁽⁴⁾ investigated.

Writers regretted that the stamiferous flower-bud could not be gathered as a sample in both seasons, and we could not investigate the relation between the stamiferous flower bud and its development.

ACKNOWLEDGEMENT

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オリヴの形態学的研究. I.

(1) オリヴの花芽の分化並に花器の形成に就て.

野呂癸巳次郎・井上孝広

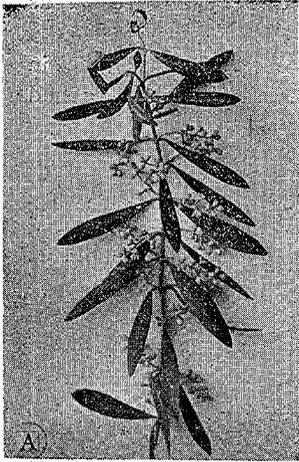
摘 要

1. 学内にある約20年生の Mission に就き花房と花芽の分化生成に就き検討した
2. Section 法及び剥皮法を併用した.
3. 花房の分化期と花芽の分化期は殆ど全時である. Section 法に依る時は昭和26年4月25日, 昭和25年4月17日, 剥皮法に依る時は昭和26年4月18日で前者より1週間早やく現はれて来た.
4. 開花の満開期は昭和26年が6月3日, 昭和25年は5月28日であつた
5. 以上の調査研究よりして結論を下す時は平井町にて開花6週間前が分化期であり, 欧米各国より約2週間(開花期を標準として)遅れる事を知つた.
6. 花器の構成は King 氏の研究結果と全く一致した成績を得たから解説を省き図に依り示した.

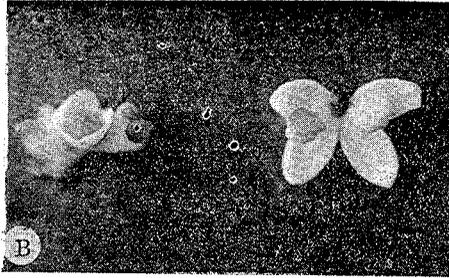
(26.9.25) .

Fig. 1

Fig. 2



A. Paniculate inflorescence of Mission olive



B. Flower of Mission olive.
Left, Perfect pistil. Right, Petal and stamen.

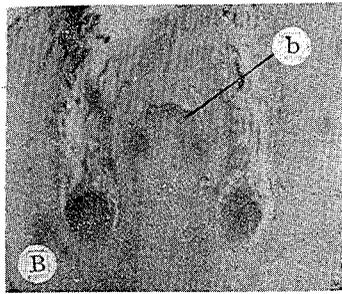


Fig.2. Passerine olive (?)

Fig.3



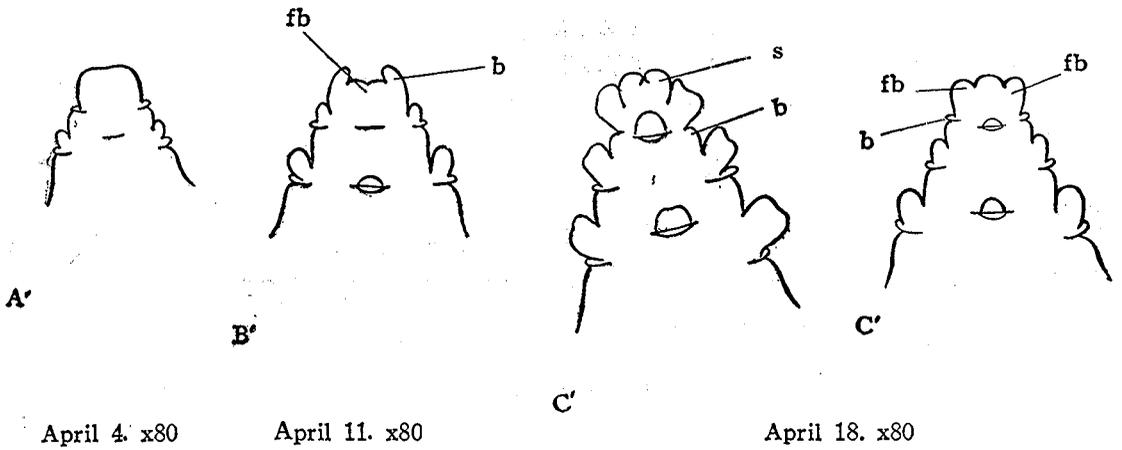
April 4. x50



April 11. x50



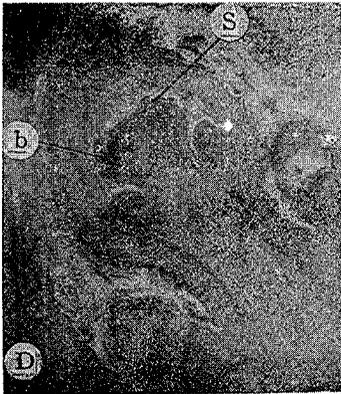
April 18. x50



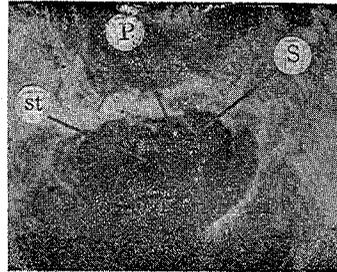
April 4. x80

April 11. x80

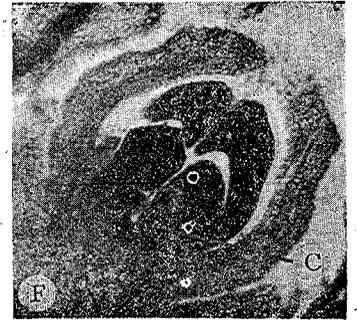
April 18. x80



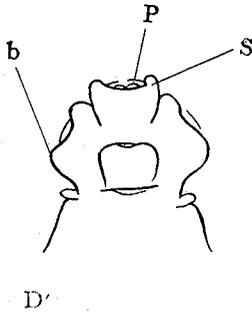
April 25. x50



(E) May 2. x50



May 9. x80



D'

April 25. x80



May 13. x80



May 26. x80

Fig.3 Development of floral parts in olive flower bud: A, Vegetable buds: B-C, Stage of pre-initiation of inflorescence: D, Stage of initiation of floral organ: E-H, Successive stages in early floral organ development. Details are: s, sepal primordia or sepal; p, petal primodia or petal; st, stamen primordia or stamen; c, carpel primordia or pistil; b, bract; fb, flower-bud. strip method: A'-D'

ERRATUM

	Error	Correct
Fig.3 C'	S	s
// E	P, S.	p. s
// D'	P, S	p. s.