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Vegetative and Reproductive Physiology of April Flush in Mango (*Mangifera indica L.*) cv. Dusehri

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ABSTRACT

April flush in mangoes blooms heavily therefore its vegetative and reproductive physiology was needed to study to explore the reasons of its being more productive. Data was collected to determine the ultimate fate of April flush, whether it continues intermittent growth or ends up as quiescent. The flushes which ceased their growth after first extension in April had more time for attaining maturity and hence bloomed more frequently as compared to the flushes, which though emerged from this source during the late parts of the year and continued or ceased growth after one or two extensions.

Key Words: Mango; Vegetative; Reproductive; Physiology; Growth pattern; Flush; Dusehri

INTRODUCTION

Mango is extensively grown in tropical and subtropical regions of the world. Pakistan produces 1.089 million tonnes mango annually on an area of 105 thousand hectares and is on 5th number in the world (Anonymous, 2005). The commercial cultivars however suffer from the intricate problems of alternate bearing and mango malformation, which appear mainly because of enigmatic blooming and vegetative growth behaviour (Chacko, 1989). Growth in mango occurs in flushes and thus a period of growth may follow a period of quiescence, which appears essential to ensure flowering (Popenoe, 1939; Chacko, 1984). Mature flushes if high in starch bloom more readily (Chacko, 1984).

Flushes of one month may re-flush during the subsequent months. Similarly April flushes, which are considered to be the more productive may re-grow several times during the following months or may cease to grow anymore to attain blooming maturity and thus this becomes essential to determine pattern of growth of this flush. Most of the vegetative growth produced is from non-flowering shoots and the shoots, which carried mature fruits, have been reported to have markedly lower probability of vegetative growth (Issarakraisila & Considine, 1991). The present study was subjected to understand the pattern of vegetative and reproductive growth physiology of April flush in order to regulate the growth and health of plant and in turn to enhance blooming flushes yield.

MATERIALS AND METHOD

Studies were carried out at Experimental Fruit Garden (Square No. 9) of University of Agriculture, Faisalabad during 1999–2001.

Four trees of mango c.v. Dusehri were selected for these studies. During first year of study newly emerged April flushes on these trees were tagged randomly to study their vegetative and reproductive pattern during the following months of the year and the spring of the following year. Emergence of flushes was observed in each month and every emerging flush from the previously tagged April flush was tagged accordingly.

The experiment was laid out in four replications keeping one hundred flushes in each replication. Followings were the treatments in this research work.

1. April flushes
2. April based May flushes
3. June flushes emerged from April and April based May flushes.
4. July flushes emerged from April and April based May and June flushes
5. Other flushes appeared from the same source after July.

During the next year in spring, the flushes were observed for their reproductive, vegetative as well as quiescent behaviour at the time of blooming. April and April based flushes of the previous years were observed under following parameters.

1. Flushes remained quiescent
2. Flushes sprouted vegetatively
3. Flushes bloomed (healthy & malformed panicles).

RESULT AND DISCUSSION

Vegetative growth pattern. The vegetative growth pattern would be specific to various cultivars and also under a set of climatic and management conditions. Dusehri cultivar in this study indicated that only 5% of April flushes could restart their growth in May, while other (i.e. 95%) ceased to grow (Fig. 1). These 5% April based May flushes could not restart their growth in June and remained ceased. During the month of June, 38.25% of April flushes re-flushed again. During the month of July total flushes emerged from April and April based May and June flushes were 17.25%. These were contributed by April and April based May and June flushes in an order of 12.0%, 2.5% and 3.0% flushes, respectively and all these flushes ceased to grow further. After July no flush emerged from the April or April based flushes. The flushes which after first extension could not grow further were found to be 44.75%, 2.50%, 35.75% and 17.25%, from April, April based May, June and July flushes, respectively (Fig. 2).

The pattern of re-flushing and cessation of growth during different months indicated that growth generally occurred in alternate months. It was reported earlier by Popenoe (1939) that each period of growth was followed by a period of inactivity following, which next flush was developed. Similarly Singh (1978) also reported that development of each new shoot was followed by a period of dormancy and it was found to help the shoots to attain physiological maturity for fruit bud differentiation.

Vegetative growth behaviour of the tagged flushes. The April based flushes were tagged during first year and were observed for blooming or retaining vegetative characteristics during spring the following year. Some of them were found blooming while the others retained their vegetative characteristics. Fig. 2 shows the vegetative behaviour of the April and April based vegetative flushes during subsequent year. The percentage of April, April based May, June and July flushes that ceased further growth after-wards was 44.75%, 2.5%, 35.75% and 17.25%.

The vegetative growth of April flushes in following spring was low (2.75%). In subsequent months, the vegetative growth of April based flushes from previous year was greater than April flushes i.e. 2.25%, 6.25% and 7.25%, respectively. It means that April flush is more important for blooming, while April based May, June and July flushes showed more vegetative growth with less blooming percentage. The flushes of these months are reported almost of equal importance as regard blooming but their source should be previously quiescent or older flushes i.e. one-year-old flushes. The result corroborates the observation of Monselise and Goldschmidt (1982), who reported that early flushes were found more important for producing more fruits (inflorescence) in mango. Delayed vegetative growth reduced the potential for new shoots to flower the following season.

Blooming panicles (Healthy & Malformed). The April and April based flushes were observed for their blooming pattern during the spring. The observations are presented in Fig. 2, which indicate that 44.75%, 2.50%, 35.75% and 17.25% of April and April based May, June and July flushes ceased their growth in first year, respectively. During the following spring, the percentage of bloomed panicles on April flushes were 31.50% and out of these bloomed

Fig. 1. Vegetative growth pattern of April flushes during subsequent months

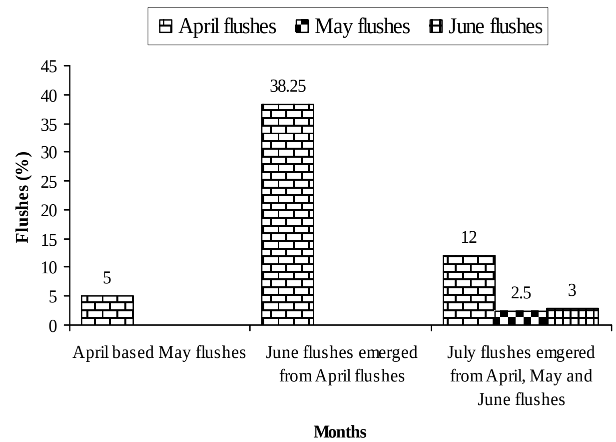
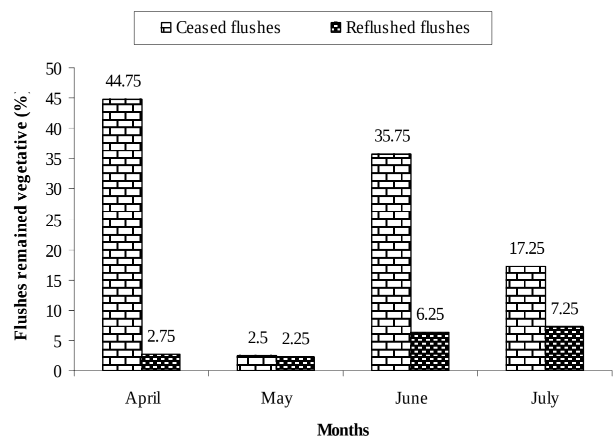


Fig. 2. Percentage of April and April flushes remained vegetative during subsequent year



panicles, 17.25% panicles bore healthy flowers and the remaining panicles suffered from the disorder of malformation, which amounted to be 14.25%. There were only 0.25% bloomed panicles of May flushes and were all malformed, while on June ceased flushes the healthy panicles were 12.99%, while 15.0% were malformed on April based June flushes. Healthy panicles were 6.0% out of 10.0% bloomed panicles from April based July flushes, while the rest were malformed (Fig. 3).

The results indicated that April based panicles have quite higher tendency of suffering from floral malformation. This could be due to more proportion of blooming on these flushes or needs to work further on this aspect.

Dormant flushes. Fig. 4 shows percentage of April and April based dormant flushes during first year and that remained quiescent during subsequent year. In April when mangoes started re-flushing either vegetatively or reproductively, 10.3% of April flushes, which ceased growth after flushing in April last, year still remained quiescent. All the April based May flushes grew either vegetatively or reproductively and thus no dormant flush

Fig. 3. Percentage of bloomed and healthy panicles on April and April based flushes

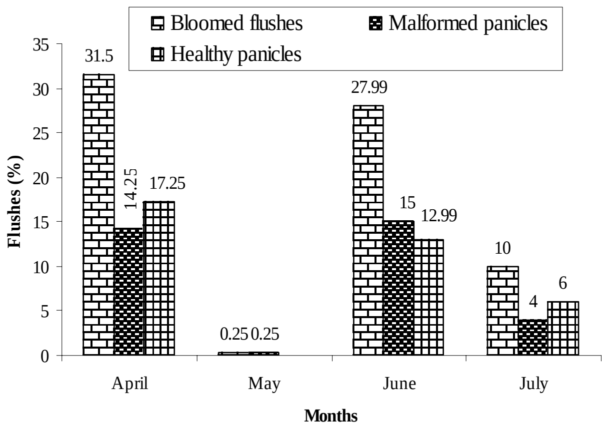
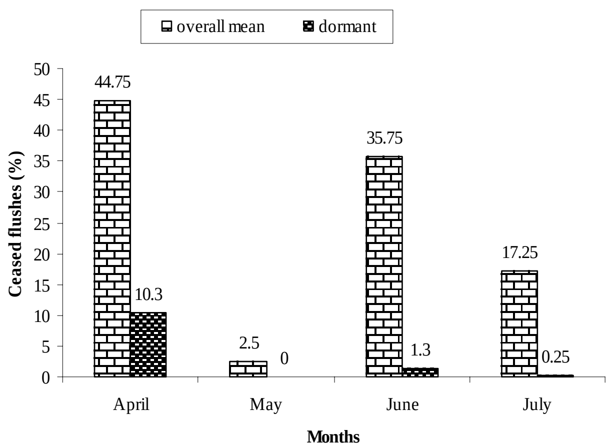


Fig. 4. Percentage of April and April based flushes remained dormant during subsequent year



was observed. About those of April based June flushes, only 1.3% flushes remained dormant out of 17.25% ceased flushes of first year. Regarding the behaviour of those, which ceased growth after July last year, the pattern of quiescence was similar to that of May and June flushes.

The comparison of dormancy among four months' flushes shows that greater percentage of dormant flushes appeared weaker and thus they could not grow vegetatively in the same and following season either vegetatively or reproductively. May flushes continued growth vigorously as they emerged from vigorous April flushes, which continued their growth in two months i.e. April and May. The dormant flushes of April appeared too weak to grow again in the same season or the season during the following spring. Greater number of June and July flushes grew in the following year but only few of them could bloom and all the others initiated vegetatively in the spring season.

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