Angiosperms exhibit wide variations in the pattern of vegetative and reproductive phenology both on large and small geographic scales. Phenological studies are aimed at the correlation between plant growth and development on one hand and seasonal climate in particular, on the other. In order to explain phenological diversity climate, seasonality and species composition are to be taken into consideration (Kochmer and Handel, 1986; Heideman, 1989, Wright and Calderon, 1995). Phenological studies have been carried out primarily on the flora of tropical seasonal forests (Reich, 1995; Murali, 1997; Justiniano and Fredericksen, 2000; Morellato et al., 2000), neotropical forests (Morellato et al., 1989; van Schaik et al., 1993 and Hamann, 2004) and evergreen mountain rainforest (Bendix et al., 2006). Although phenological studies in which the pattern of flowering and fruiting in seasonal forests have been correlated with variation in rainfall and temperature, the relationship between climate and reproductive phenology of plants remain ambiguous.

Phenological studies so far conducted in India are found to be pertaining to tropical rainforest tree species (Singh and Singh, 1998; Comprehensive Study on the Phenology, Morphology and Seed Germination
Kushwaha and Singh, 2005; Singh and Kushwaha, 2006). In addition to flowering and fruiting phenology, effect of meteorological data, particularly that of rainfall, on seed size, production, dispersal and germination have been investigated only in tree species (Murali, 1997; Poulin et al., 1999; Bendix et al., 2006).

Seasonal occurrence and duration of flowering and fruiting of plants depend on rainfall and many other environmental factors such as temperature, relative humidity, specific wet and dry seasonality of the area and the impact of these environmental factors vary from plant to plant (Morellato et al., 2000; Bendix et al., 2006; Singh and Kushwaha, 2006).

Flowering plants differ considerably with respect to flowering and fruiting phenology and number, size, shape and dispersal mechanism of their seeds. Even though such information is of considerable interest, there is shortage of data concerning the seed germination biology in relation to phenological events.

Only very few comprehensive studies exist regarding the seed number, shape, size/weight, dispersal mechanism of angiosperms of a particular flora or region (Baker, 1972; van der Pijl, 1972; Grime et al., 1981). Almost all phenological studies on seed biology pertaining to different climatic conditions have been conducted on flora in general and trees in particular of different types of forests (Garwood, 1983; Foster, 1986; Murali, 1997).

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Although seed dispersal and germination behaviour have been investigated in specific plant forms such as trees (Ng, 1973; Marshall, 1986), only very few data are available on seed biology of plants growing in a restricted area or local flora (Grime et al., 1981).

According to Baskin and Baskin (2001), much information is available in the literature on seed germination phenology of individual species and these data show that each species has a characteristic germination season (or seasons) and the most important objective of seed germination ecology is to explain how the timing of germination is controlled in nature. Fruiting phenology also appears to be rightly correlated with seed development, seed dispersal and germination (Baskin and Baskin, 2001).

Seed biological/physiological aspects that are controlled by flowering and fruiting phenology under varying climatic conditions are desiccation sensitivity, storability/longevity and dormancy distribution of seeds. Desiccation sensitivity is considered as an advanced character (Dickie and Pritchard, 2002; Pritchard et al., 2004; Daws et al., 2005). According to Oliver et al. (2000), Dickie and Pritchard (2002), flora of tropical rain forest constitute species with desiccation sensitive seeds in abundance.

To date, precise phenological information with respect to flowering and fruiting in general and seed biology in particular of a local flora with varying monthly rainfall is scarce. Hence, this study aims to provide new
insight into the phenology of flowering, fruiting and seed biology and their correlations to monthly rainfall variations of Calicut University Campus flora.

The University of Calicut came into being on 23rd July 1968. The main campus, where the headquarters of the university is located, is at Thenhipalam, 23 km south of Kozhikode city at the western boundary of Malappuram district of Kerala in south India, and is 10 km away from Kozhikode airport. It covers over an area of 500 acres on both sides of the Mangalore-Edappally N.H. 17 spread in three Panchayats, Thenhipalam, Pallikkal and Chelambra. The campus falls within latitude N-11°8’19.13” N and S-11°7’58.10” N and longitude E- 75°53’32.63” E and W- 75° 53’11.20” E at an altitude of 40-60 meters above sea level.

The Campus area constitute mainly level plots amidst undulating terrain of rocky hills interspersed with dry and moist valleys and patches of green paddy fields. Laterite is widespread and forms capping over hard rocks. Small areas with clayey soils are also present in the campus. Due to the variation in the topography and soil type, considerable diversity can be expected in the flora of the campus. Geographically, the flora of Calicut University Campus is much similar to the tropical flora and also quite a large number of plants, particularly avenue trees and ornamental plants have been introduced to the campus.
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Although the Calicut University campus is comparatively a very small area, studies on botanical survey and identification of the flora have already been undertaken (Sivarajan, 1974; Manilal and Sivarajan, 1976). Those authors identified and cited the plant names and flowering time of each species. Nevertheless, the present author proposes a systematic study for the phylogenetic classification of angiosperms as one of the objectives of the investigation. Even though identification of all flowering plants may not be possible during the study of 2 years, a phylogenetic classification of the flora of Calicut University Campus is envisaged.

As mentioned above, systematic studies have been conducted on different types of flora (van Schaik et al., 1993; Justiniano and Fredericksen, 2000; Bendix et al., 2006) and phenological studies on plant growth and development pertaining to climate, particularly rainfall (Morellato et al., 2000; Singh and Kushwaha, 2005). Despite the availability of meteorological data such as temperature, humidity etc. in the present study, rainfall only is proposed to be taken as an environmental factor for the phenological studies because significant fluctuations do occur in the rate of rainfall that control or affect other climatic conditions of plant growth particularly seed biological aspects.

As phenologically significant processes in plant growth and differentiation include flowering, fruiting, seed dispersal, germination etc. and

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these developmental phases are dependent on and controlled by climatic conditions, the foremost objective of the investigation is the elucidation of the effect and importance of rainfall on phenological aspects of flowering, fruiting and seed biology.

For the systematic investigations of phenology of flowering and fruiting (Justiniano and Fredericksen, 2000; Morellato et al., 2000; Bendix et al., 2006; Singh and Kushwaha, 2006) repetitions of phenological cycles and synchronising of events during successive years are to be studied. However, in the present study the duration of investigation is only 2 years and hence phenological cycles which get triggered by climatic condition like rainfall are not directly comparable with existing publications on phenological studies of flowering and fruiting. Nevertheless, the results are correlated to the reproductive phenology of tropical flora (Richards, 1952; 1996; Huston, 1994; Reich, 1995) since the phytogeography of Calicut University Campus is tropical.

In addition to flowering and fruiting phenology, morphology of fruits and seeds, dispersal mechanism etc., also are included as the objectives of the present study. Seed biological aspects such as distribution of dormancy, effect of drying, storage and germination behaviour are proposed to be studied. Correlation of seed character with phenology will enable a tentative

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classification of seeds based on germination on one hand and storage on the other.

Another important aspect of the investigation is seedling emergence and the classification of functional morphological types of seedlings. Similarly, morphological variations, rather modifications of the cotyledons also are proposed to include in the investigation. In short, the author proposes an integrated interdisciplinary approach with different experimental strategies and perspectives for the study of Calicut University Campus flora.