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It is a matter of profound interest of biologists to go into the details of growth and development of living organisms, which starting from a single cell, and passing through various stages ultimately end in death/senescence. There are so many approaches to study the developmental process which the living organisms undergoing. Different disciplines such as morphology, physiology, embryology, genetics, biochemistry and biophysics can be used as efficient tool to explain growth and development of living organisms.

Since the conceptual way has observed the regulatory influence of environmental factors on growth and development of plants. Light and temperature are two major environmental factors, which act as signal to set in motion certain internal process which ultimately manifest externally as a developmental changes like organ differentiation, transformation of vegetative stage to reproductive stage etc.

In 1818 Casimir studied the importance of temperature on flowering of cultivated varieties of cereals. He investigated the effect of different temperature regimes during germination and early growth of winter and spring rye. Later Lysenko (1923) the Russian physiologist carried out the same work in USSR. He devised a technique to induce or set the necessity of cold temperature during the early stages of growth of wheat. Later
this technique is the exposure of the plants/seedling to low temperature in order to induce early flowering came to known as vernalization.

The importance of day length on the life cycle of plants was first clearly demonstrated by Jenner and Allard in 1929. The response of plants to the day length especially in terms of growth and development more precisely the transition of vegetative stage to reproductive stages is known as photoperiodism.

Lysenko's theory of phasic development had gained tremendous momentum during 1930-50. According to him every plant should irreversibly pass first through a temperature sensitive phase (thermophase) and then a light sensitive phase (photophase). Lysenko (1951) concludes from his experiments that the plant can only pass the photophase after it has accomplished the thermophase. Biennial fenugreek is the best example which obeys his theory so nicely. It becomes ready for vernalization only after a juvenile phase of 10 days (Sarker, 1958) and can be induced by LD only after at least 7 days of vernalization.

Although some biennial plants can be vernalized as seeds (e.g., beet) most of them must reach a certain size before the cold treatment becomes effective unless the plants were more than seven week old when the treatment began (Tellensiek, 1958).

Turville and Gregory (1937) discussed the short-day vernalization in rye. Later Aukule (1964) and Bokhtare and Hinberg (1977) observed short-day vernalization in some winter wheat varieties and in Iranian winter barley respectively.
Same phenomenon Bellersick (1953) first reported in a dicotyledon, namely Campanula persicifolia. Long-day vernalization was reported by Nathan (1966 a, b) in Campanula longestyla, Lactosa columnaria and in C. esculenta. Reid and Wastell (1975, 1977), Wastell (1977), Wastell and Atkin (1979) and Reid (1981) in certain late flowering genotypes of Figlum antivum containing the gene cm.

The interaction of vernalization with light is important with regard to flowering in many plants. Listowski and Rocekowska (1964), Listowski (1964), 1966 a, b, 1965 a reported the requirement of LD prior to vernalization in order to induce flowering in certain plants. While Nathan (1966 b, 1965 a), Listowski (1965 b), Pierik (1967 b) and Faberko et al. (1974) found that LD or continuous light prior to vernalization is effective in Lycopersicum esculentum, Gynotum brevis var. cultures Ipomoea fulva, Cardamine arlegris and certain wheats such as cv. Odessa 25 and hemostayvall. Brekule (1964) and Hartman (1964) reported the role of light combined with vernalization which is more efficient in certain winter wheat varieties. Faberko et al. (1974) also reported the positive role of light during vernalization in certain wheat varieties. However, the light during vernalization reduces its effect in several dicotyledons e.g. celery (Pressman and Legih, 1987). It has long been proved that in some plants specific day length (light exposure) is required for the manifestation of vernalization effect. Most are long day plants (LDP) (Bellersick, 1970). Some
are day-neutral plants (Hi 10) or short-day plants (FTP).

Extensive study has been devoted to disclose the nature of the physiological and biochemical processes involved in plants under the influence of environmental factors. Since the metabolism of most plant is considerably retarded at cool temperature, the involvement of active physiological process may be ruled out. Various hypotheses have been put forward to explain the negative temperature coefficient of vernalisation. Put Ishikawa and Tateyama (1967) observed the formation of new IBA following vernalisation. Kemasak (1972) reported the appearance of new protein during the period of vernalisation.

Indigenous GA is playing a major role to hasten flowering in HiP which will build up due to the cold temperature treatment. Challakhyan (1977) proposed that gibberellins is one of the two complementary stimuli which constitute florogen. It is the component of first group of florogen and it is needed for the formation and growth of flower bearing stem, and obviously in the first phase of flowering (Challakhyan et al., 1977).

The photoperiodic stimulation of flowering involves events both in the leaves and the meristems. Flower induction takes place in the leaves in response to photoinductive light/dark cycles, while evocation occurs in the meristems in response to the arrival of flowering stimulus leads to floral merophyogenesis. The pigment system which exist in plants and which mediates the photoperiodic process was established from the experiments conducted on Antirrhinum and Lilium tigrinum (Farkas et al., 1946).
Konstantinova et al. (1976) demonstrated the involvement of photosynthetic pigments in induction of flowering. Sherrard et al. (1980) reported synthesis of new proteins in shoot apex under inductive photoperiods.

Most of the cruciferous members are important plants in the field of physiology of flowering e.g., mustard, cauliflower etc. Extensive work has been done on radish to study the effect of vernalization and photoperiodism. Vince-Prue (1975) reviewed it at length in her book entitled «Photoperiodism in Plants».

However similar kind of work in India on Indian varieties of radish is scarce. Though vegetative parts are consumed more than seeds in case of radish, for raising the progeny seed is of vital importance and it depends on flowering. The flowering process is therefore of the greatest importance in this case and limitations to the initiation and further development of flowers often adversely affect the propagation and yield (seed production). Moreover radish plants are cultivated widely in Gujarat. It is an important vegetable crop and an excellent plant to study the environmental effect on flowering. It is a quick growing annual/biennial with rosette habit. At the time of flowering, the condensed stem grows out into an elongated inflorescence that bears cruciform flowers. The objective of the present study is to understand/analyse this plant’s response to certain environmental factors like temperature and duration of daily light period which are critical to its growth and development.
For this the following experiments were carried out.

1. Effect of vocalization
   c. Hormonal level eg. GA and cytokinin.

2. Effect of different sowing time
   a. On flowering and
   b. Dry matter production.

3. Effect of vocalization and photoperiodism
   a. On growth indices like PAlH, PGR and LHR
   b. Yield components.

4. Interaction of vocalization with photoperiodism and its effects
   a. On flowering
   b. Metabolic and pigment level in top two leaves and
   c. Changes in shoot apices (metabolic level during transition).