

INTRODUCTION

Nutraceutical evaluation of some wild edible tuberous plants.

India is self sufficient in food, but it has not attained food security at the household level particularly in the rural areas. A large number of proportions of rural population is still undernourished. The People living in most of rural and remote areas do not meet their food requirement properly. Therefore, a large number of rural populations are meeting their nutritional requirement by consuming various wild resources (Singh and Arora, 1978). So, these wild edible plants play a vital role in fulfilling nutritional requirements of the rural people in remote areas of our country. Traditionally, health and nutrition are interconnected and many plants are consumed as food so that the through study of nutraceutical is essential. In addition, today there has been an increasing awareness about the nutritional status of the community. Many of the wild edible plants have both therapeutic and dietary functions. Such medicinal foods have been part an oriental medicinal theories, since ancient times. Recently it is gaining attention in USA, Europe and Australia within the fields of 'Nutraceuticals' (Balentine *et al.*, 1999). The nutraceuticals are nothing but the functional foods that provides potentially disease preventing and health benefiting properties (Kalra, 2003). The research in several regions has illustrated that many wild plants used in local diets are inseparable from traditional therapeutic systems (Fleuret, 1993). Since ancient times, it is supposed that "food as medicine". Etkin and Ross (1982, 1991) observed that many wild edible plants were used largely in therapeutics and dietary purposes in West African.

Many wild edible species provide minerals, fibers, vitamins, essential fatty acids and enhance taste and colour in diets. In addition they have antibacterial, antifungal, and anticarcinogenic properties and therefore it's got medicinal value. These plants also contributed the multiple uses to humans taking into consideration

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not only the direct contribution from wild edible plants but also advantages of indirect uses that means providing nutrients, adding a dietary variety, feeding livestock or providing medication for humans or livestock. (Falconer, 1990). A wide variety of wild edible plants such as leaves, fruits, flowers, roots, barks, nuts, tubers etc. are consumed by rural masses. The tuberous plants are characteristically having a storage organ on or below the soil surfaces; this organ may be true bulb, corm, tuber, tuberous roots, rhizome, stolon or pseudobulb. These plants are rich source of carbohydrate and nutrients. Wild edible tuber species are an important source of food in India and have a significant place in the dietary habits of forest dwelling communities. These edible tubers not only enrich the diet of the people but also possess medicinal properties. Also many of tropical tuber species are used in the preparation of stimulants, tonics, carminatives and expectorants (Edison *et al*, 2006). The wild edible tuberous plants are important but fast disappearing element of diet so far have been largely neglected in scientific studies. Nevertheless, a careful examination of the literature reveals that there are still a large number of wild edible tuberous species which are inexpensive and commonly used by local people, whose nutritional potential have not yet been adequately studied. So that the present study carried out nutraceutical evaluations of some wild edible tuberous plants such as *Brachystelma edulis*, *Ceropegia bulbosa* var. *bulbosa* and *Ceropegia hirsuta*. These three wild edible tuberous plants of genus *Ceropegia* and *Brachystelma* are consumed by the rural people of Kolhapur and Satara district. Tubers of *B. edulis*, *C. bulbosa* var. *bulbosa* and *C. hirsuta* are starchy and somewhat bitter in taste and have got a potential food values (Gaikwad and Yadav, 2004).

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***Brachystelma edulis* Coll. and Helmsl.**

The genus *Brachystelma* R.Br. is represented by about 100 species in world. There are 14 species in India and 3 species in Maharashtra. The name *Brachystelma* is derived from the Greek words 'Brachy' means short and 'stelma' means crown, garland, wreath (for the nature of the corona). These species are restricted to small areas. This species is originally known from Burma and Siam (Thailand). The *B. edulis* is one of them belongs to family asclepiadaceae and commonly called as Galya or Hanuman batata. It is distributed on partially degraded hill slopes and open hill tops among grasses. It is a perennial dwarf herb with linear to narrowly elliptic leaves bearing tuberous roots. Flowering of the species is very peculiar. After first shower of premonsoon in mid May the plants sprout out initially and produce scaly leaves. On the lateral sides of each scaly leaf one or two flowers are produced usually one on each side of scaly leaf. After flowering and fruiting the plant produce foliaceous leaves. Rarely flowers, fruit and foliaceous leaves are produced simultaneously. Main flowering season is May to June. The tubers are approximately 5 to 75 gm, 3 to 12 cm diameter, flattened, smooth, light brown in colour. The tubers of *Brachystelma edulis* are known to be eaten as a food supplements in rural areas when there is food shortage. Thus it is source of food during famine. Wild animals such as hare, rats, and wild bear are also fond of these tubers. Therefore, it is a survival food for plants, humans and animals (Patil, 1990). Tubers cooked as vegetable with salt and spices. The tubers are also a definite source of water in the dry habitats where the plant occurs. This species is not specifically mentioned for medicinal use in the literature, but many of the tuberous *Brachystelma* are known to be used medicinally for

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headache, stomach ache and colds in children. It is a significant famine food plant and therefore there is possibility of utilizing the tubers as food in rural people.

CEROPEGIA: *C.bulbosa* and *C.hirsuta*

The genus *Ceropegia* was first proposed by Linnaeus in his 'Species Plantarum'. The generic name *Ceropegia* Linn. is derived from '*keros*'= wax and '*page*'= fountain; (The flowers look like a mountain of wax). The genus belongs to family asclepiadaceae which is represented by about 200 species. Among them, there are 49 Species in India out of which 23 species found in Maharashtra. These are distributed over most of Africa, Madagascar & Arabian peninsular, the Indian subcontinent, the Far East and into the northern part of Australia. Each species of *Ceropegia* is very distinct. Most of the species of *Ceropegia* occurring in Maharashtra are found along eastern and western belts of sahyadri ranges in localities away from human influence. Among these *Ceropegia bulbosa var.bulbosa* and *Ceropegia hirsuta* are comparatively more common and found distributed throughout India.

***Ceropegia bulbosa var.bulbosa* Roxb.**

Ceropegia bulbosa var.bulbosa belongs to family asclepiadaceae and commonly called as Kharpudi or Khartundi. It is widely distributed throughout dry deciduous forest growing in rocky areas in red laterite soil. It is perennial twinning tuberous herb with thick, fleshy, orbicular to ovate succulent leaves. The flowers are pale gray at base, becoming grayish-purple towards the mouth. Corolla up to 2.5 cm long, glabrous, linear tube above on ovate, deltoid leaf purple within and hairy inside. Flowering and fruiting occur from July to October. The tubers are approximately 4 to 35 gm, 1 to 6 cm in diameter, sometimes flattened caudex, gray to white colour covered with roots. Its fresh or boiled tubers are eaten as food.

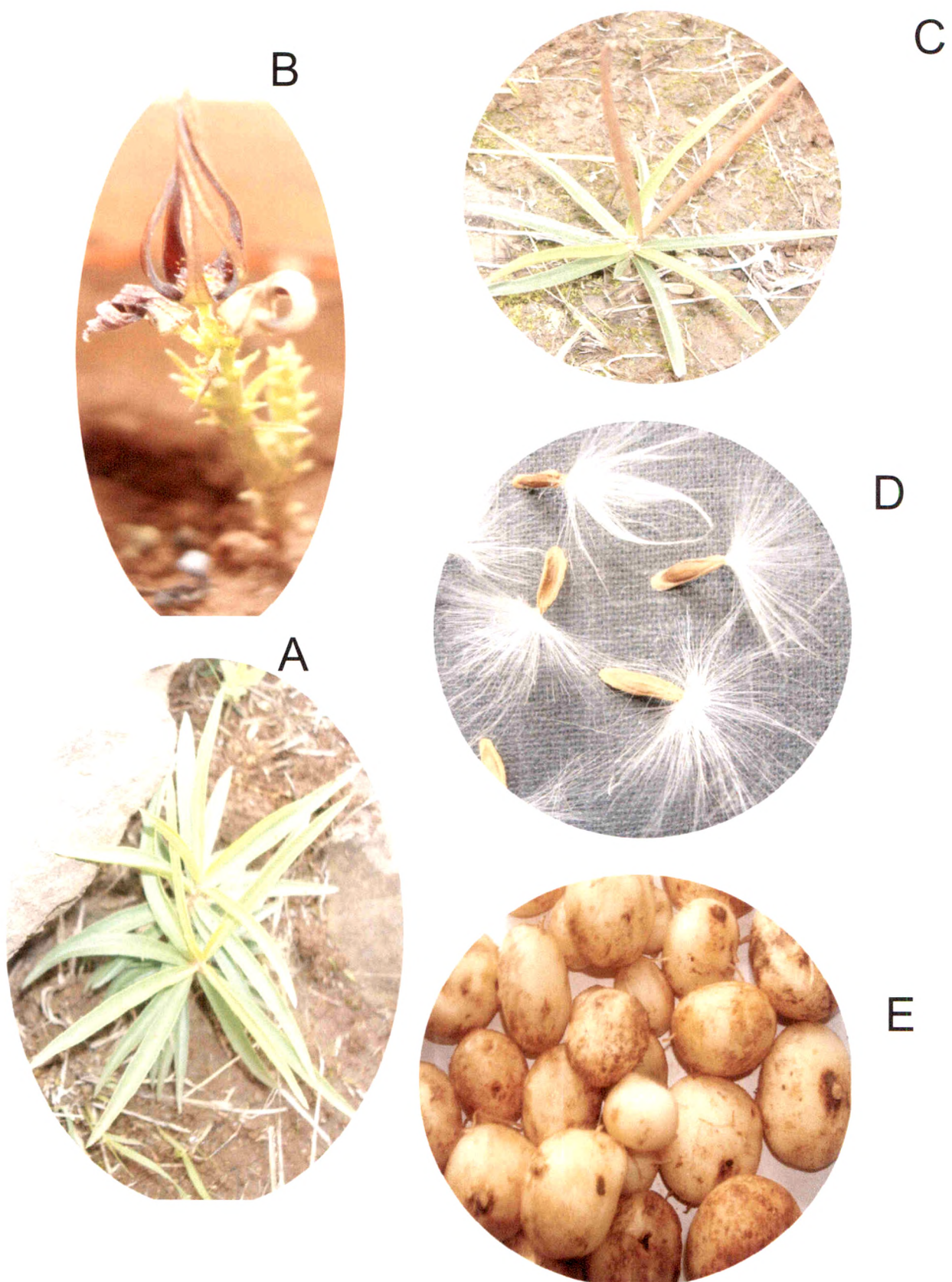


Plate 1 Habit of *Brachystelma edulis*: A. Habit; B. Flower; C. Follicle; D. Seed; E. Tubers

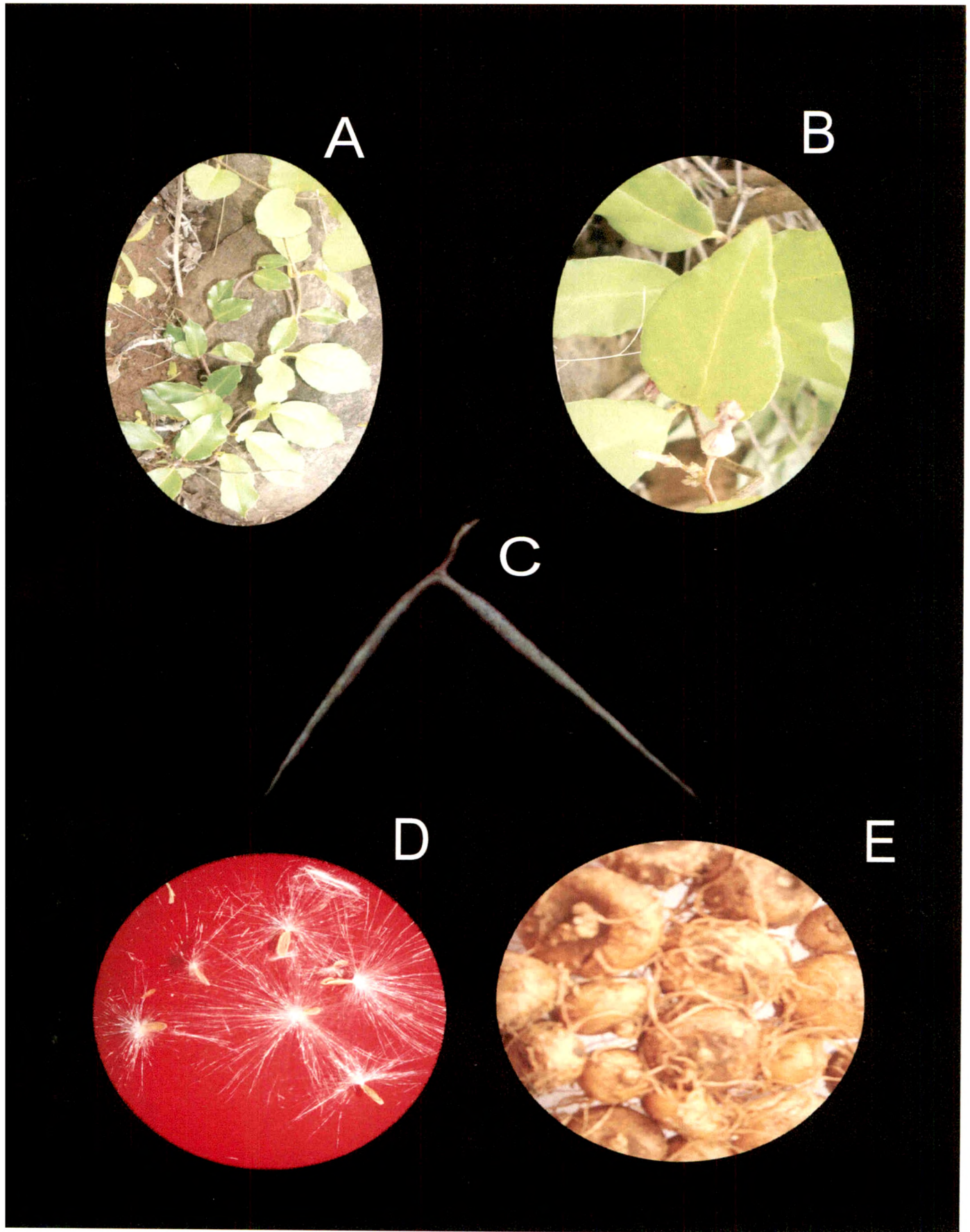


Plate 2 Habit of *Ceropogia bulbosa*: A.Habit; B.Flower; C.Follicle; D.Seed; E.Tubers

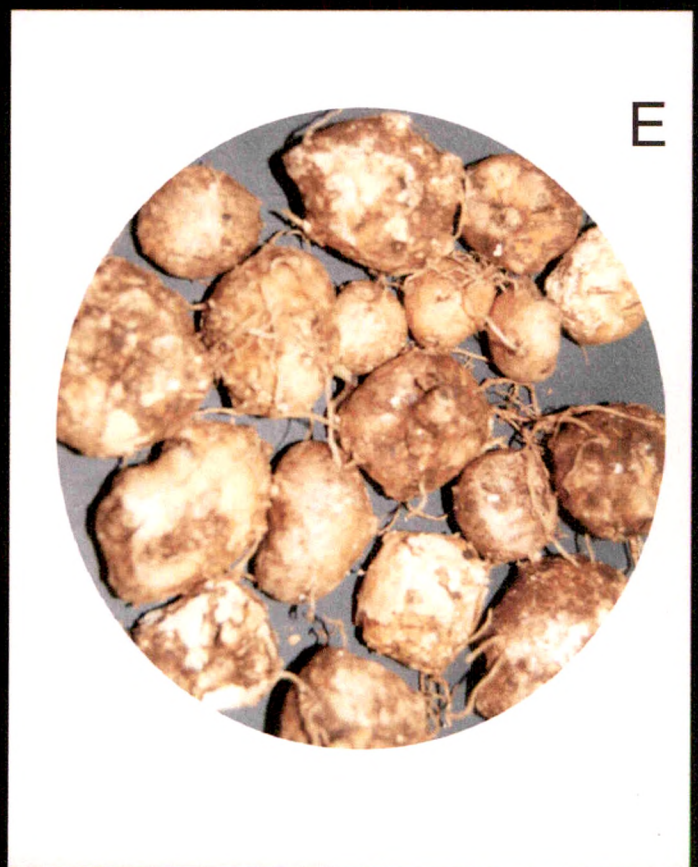


Plate 3 Habit of *Ceropogia hirsuta*: A.Habit; B.Flower; C.Follicle; D.Seed; E.Tubers

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The alkaloid is extracted from the tubers used in Bihar in colds and eye diseases (Kirtikar and Basu, 1975). Its leaves are acidic and used as vegetable. It is important medicinal and food plant and therefore, there is a necessity to study its medicinal properties.

***Ceropegia hirsuta* Weight & Arn.**

Ceropegia hirsuta belongs to family asclepiadaceae and commonly called as hairy *Ceropegia* or Hamana. It is widely distributed. It usually grows frequent on hill slopes in grasslands in rocky substratum. It is perennial coarse twinner with membranous, broad, elliptic to ovate petiolate leaves covered with hairs. It produces 5 cm long showy flower having beige coloured tube and mottled olive brown or purple upwards. The petals are very broad and yellowish or apple-green coloured. The flowering and fruiting start from August to November. It has subterranean, globose or depressed tuber with 5 to 45 gm, 2 to 6 cm in diameter. The skin of tuber is straw to grey colour and inside white. The tuber of hairy *Ceropegia* are eaten as a vegetable with salt and spices or boiled tuber with milk and sugar. The leaves of it are eaten in stomach disorders (Jagtap *et al.*, 2009). It is an emerging food as well as medicinal plant and can be used in production of industrial starch.

The dissertation is divided into four chapters. Review of available literature has been carefully compiled and it forms the substance of first chapter. Second chapter is the material and methods followed for present investigation has been explained in details. The findings of the present investigation are discussed in the light of recent and relevant literature in the third chapter, 'Result and Discussion'. The significant findings are briefly summarized in fourth chapter heading 'Summary and Conclusion'. The literature cited in the thesis is systematically presented in the last part of the thesis 'Bibliography'.