INTRODUCTION
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Pan (Piper betle Linn) little known to the people outside India, is commonly used by the people in our country. It is cultivated for the sake of its leaves which are consumed in almost all parts of India. The betel leaf is chewed along with arecanut, lime and catechu and many other flavouring substances. The catechu gives some aesthetic sense, the lime acts as an irritant and aids the action of pan in causing salivation and the nicotinic acid of the tobacco offers some of intoxicating effect.

Besides, pan proves to be a valuable source of minerals and vitamins in the daily diet and is also credited with digestive and other medicinal properties. It keeps the mouth moist which is of some significance in the dry climate of our country. In using pan, we have perhaps adopted the surest and cheapest means for relaxing our jaws and thereby relaxing ourselves. Pan has also mixed itself with the religious and social functions of this country and its leaves are regarded as auspicious for a number of occasions. Betel vine is a perennial aromatic creeper belonging to the family "Piperaceae" and is cultivated in certain areas in India for its leaves. There are different names in different languages e.g. Nagbel or Pan, Tambuli(Hindi), Pan (Bengali), Pan Vilyadele(Bombay), Videcha-pana(Marathi), Pan Nagbel(Gujrati), vile-dele-kan, Vertila (Malaya); Kunyae Kiwan, Kwanynet, Knowrwei(Burma), Balat(Singapur); Tambula Magavalli(Sanskrit); kan, Tambol(Arabian), Barje-Tambol, Tambol(Persian), Betel leaf(English), Piper betle(Latin). A perennial dioecious creeper probably native of Malaysia, cultivated in India for its leaves
PARTS OF PAN LEAF

- Leaf-Apex
- Leaf-Margin
- Veinlet
- Leaf-Blade
- Mid-Rib
- Petiole
- Bud
- Leaf-Base
used for chewing. Stems semi-woody, climbing by short adventitious roots; Leaves 5-20 cm long, broadly ovate, slightly cordate and often unequal at the base, shortly acuminate, acute, entire with often an undulate margin glabrous yellowish or bright green shining on both sides; petiole stout, 2-2.5 cm long; male spikes dense cylindrical; female spikes 2.5-5.0 cm long, pendulous fruits rarely produced, often sunk in the fleshy spike, farming nodule like structure.

According to Burkill (1915) this crop apparently a native of central and eastern Malaysia and became cultivated plant, spread through tropical Asia and Malaysia and to West Indies. He also claims that the plant seems to be known to North India before 600 A.D. George Watt (1892) indicates that it is highly probable that Jawa is the native home of betel vine. So it seems that East Indies is the native home of this crop. Betelvine is cultivated on a commercial scale in India, Bangladesh, Sri Lanka and to a small extent in Thailand, Vietnam, Malaysia, Myanmar, Singapore, Philippines, Indonesia, Papua New Guanea, Pakistan etc. In India it is grown over an area of 40,000 hectares providing livelihood to hundreds of thousand families engaged in its cultivation and trade in Andhra Pradesh, Assam, Bihar, Karnataka, Kerla, Madhya Pradesh, North-Eastern states, Maharashtra, Orissa, Rajasthan, Tamilnadu, Uttar Pradesh, West Bengal etc. Annual turnover of betel leaves trade in the country is eastimated to be of 700 Rs. crores (Khoshoo 1984). India’s annual export of betel leaves worth Rs. 15 million (during 1990-91) represents a small proportion of the total production of leaves in the country and there is scope
to increase the export.

The area under betelvine in U.P. is about 3000 hectares. The principal betelvine growing districts being Allahabad, Banda, Barabanki, Faizabad, Gonda, Gorakhpur, Hamirpur, Hardoi, Jaunpur, Jalaun, Kanpur, Lakhimpur, Lalitpur, Lucknow, Raibareilly, Shahjanpur, Sultanpur, Unnao, Varanasi etc.

The cultivation of betelvine is highly intensive requiring special technique, attention and care. It is of specialized character and its cultivation is carried out by particular group of people having hereditary skill, commonly known as "Baroi". They do not reveal the details of cultural practices to others and keep them as their business secrets. They have also planned certain rules restricting the entry into the pan gardens without their consent. Further pan growers are orthodox in their beliefs which have given many limitation to its cultivation. Every operation in its cultivation is done after propitiating the "Goddess of Bhita" (As they call it) and if there is any withering of the plant, the season is attributed to the worth and anger of the Goddess. The excessive labour, time and cost involved in raising the crop set a limit to the size of the thachement which seldom exceeds beyond a quarter of an acre. pan is very susceptible to diseases and sometimes the sudden outbreak of a disease may seriously affects the cultivation in a locality causing heavy loss to the growers. It is quite certain that the cultivation of pan can be exploited to give large returns to the growers by adopting improved and latest scientific methods for growing the
Vines.

Pan is propagated by cutting taken from healthy vines at least two years old. These are obtained from vines of the previous years growth, trimmed into sections of 30-45 cm. length. Each cutting contains 3 to 5 nodes and is planted in such a manner that 2 nodes are buried in the soil and one or more nodes are above ground and pointing towards the standards on to which they will eventually be trained. In some places it is the practice to raise a nursery of root cuttings and then transplant them in their permanent planes. For this purpose, cuttings are planted closely about 10 cm apart in well prepared and shaded nurseries (Yegna Narayan Aiyar 524; Rao & Madhavachari Indian Fong, N.S.; 1966-67, 16(7), 41).

U.C. Dutta, Matria Medica of the Hindus. Leaves of this creepers are, as well known masticated by the natives of India. The poorer class makes their packet of betel with the addition of lime, catechu and betel nuts. The rich add cardamoms, nutmegs, cloves, camphor and other aromatics. Ancient Hindu writers recommended that betel leaf should be taken early in the morning after meals and a bed time.

According to Satsuma, it is aromatic, carminative, stimulant and astringent. It sweetens the breadth improves the voice and removes all foulness from the mouth.
Medicinally it is said to be useful in diseases supposed to be caused by desanged phlem and its juice is much used as an adjoint to pills administered in these disease, that is the pills are rubbed into an emulsion with the juice of betel leaf and licked up. The stack of leaf smeared with oil is introduced into the rectum in constipation and tympanitis of children with the object of inducing the bowels to act.

The leaves are applied in temples, in headache for relieving pain, to painful and swollen glands for promoting absorption, and to the mammary glands with the object of checking the secretion of milk.

Pan leaves are used as a ready dressing for foul ulcers which seem to improve under them. Excessive use produces effects somewhat similar to those of alcoholic intoxication.

In the Kankan the leaf is employed with honey as remedy for cough, and in Orissa warm juice of the leaf is prescribed by the Vylians as a felri fuge, in the quantity of a small tea-spoonfull twice daily: It is also given in indigestion of children and in conjunction with milk in cases of hysteria. A paste composed of the root of a "cotton plant" beaten up with juice of betel leaf, is employed by Ayurvedic chemists in the process of reducing a diamond to dust for medicinal purposes.
The betel vine thrives best under tropical forest conditions having a cool shade, considerable humidity and a good supply of soil moisture. It flourishes in areas with a rainfall of 225-475 cm. It is grown up to an altitude of about 900 m. in the Western Coastal regions of Kerla, North Karnataka in Mysore.

Bassein tract of Maharastra and north eastern hilly regions of Assam provide these conditions and in those areas the betel vine is grown in the shade of trees or in established arecanut or coconut gardens, without any elaborate arrangements. In all other areas, particularly in the interior regions of Deccan and South India and parts of Uttar Pradesh, Bihar, West Bengal and Madhya Pradesh. It is grown under artificially created conditions, simulating natural environment.

Betelvine cultivation needs elaborate preliminary preparations, particularly when cultivated in areas where prevailing climatic conditions are not favourable for its growth, such as extremes of temperature with hot and dry winds summer as in parts of Madhya Pradesh and Rajasthan.

The best soil for betel cultivation is clayey loam which is friable rich in organic matter and which has good drainage. Red loams, both light and heavy with good depth are also favoured. When the soil is light and loamy suitable manuring and addition of tank silt produces cultivation where the soil is coarse or stony, large pits are dug and these are filled with suitable soil before planting.
In general betalvine crop is given heavy doses of manures ranging from 25 to 100 tonnes per hectare in a year. Generally organic manure like farm yard manure, sheep manure and tank or river silt are used. Next in importance are oilcakes; other organic manures like fish manure and tannery refuge are also used where available. In Kerla and West Bengal ammonium sulphate is applied along with oilcake. Bulky organic manures are considered good for leaves for superior quality, but in certain tracts of Uttar Pradesh, these manures all avoided as they may carry disease-producing fungal spores. In parts of Anhtra Pradesh, Maharashtra, Mysore and Madras, (FYM) especially sheep manure is highly valued. In parts of Madras, cattle manure and horse dung are usually applied; some times tannery refuge is also used. In Coimbatore area, leaves of calopopis sp. are applied at rate of 10-15 cartload/ha. Wild Indigo leaves are also used, since they are supposed to improve leaf colour. In Maharashtra, castor cake is preferred as it is believed to prevent white ant attack, while in Bassein raw or dry fish is usually applied either alone or mixed with castor cake. In Madhya Pradesh linseed, till, castor or neem cakes are used whereas in Assam, a liquid manure of cowdung is used to accelerate rooting. In West Bengal dried, pulverised pond-mud, powdered cowdung and powdered oil cakes are used.

Sufficient supplies of proper plant food nutrients are necessary to produce large and healthy crops. Like other crops which yield grains, pan also required sufficient manuring for proper growth and development. Pan is also a heavy feeder, but
unlike them it requires only those nutrients which help to accelerate foliage growth on the plants. The practice of applying organic manures especially cakes for pan production is an old one and is continuing today. However, due to an ever increasing pressure of human population on land and the need to grow more food per acre farmers of Europe and America, and to certain extent of India have been compelled to apply to the lands alternate types of manures to improve crop yields.

The chemical fertilizer industry has assumed vast proportions and is producing millions of tons of fertilizers. These manures are more concentrated than organic manures and are in soluble conditions and hence their effect is immediate and marked in improving plant growth. Since the requirements of different crops in respect of nitrogen and other nutrients vary from one crop to another and from one soil to another. It is possible to prepare suitable mixtures of chemical fertilizers to suit each locality and each crop, whereas the composition of organic manures is more or less constant.

Besides using cakes the pan growers also practice the use of ghee and butter milk as well as wheat flour in belief that their application will keep in checking certain diseases. Commercial fertilizers are generally not used in the cultivation of pan.

During recent years the practical importance of nitrogen fertilization has attracted increasing attention. It has been very well established that in most horticultural crops nitrogen
is the most important nutrient element which influences growth and development of plants and is most concerned with the yield of leaves. Apart from this nitrogen is special importance in the formation of protein in plants, especially in the leaves. It forms the constituent of living cells in the plant where nitrogen is present in sufficient quantities in the soil, plants acquire a healthy green colour, growth of plant is fairly rapid and the crop on maturity gives high yield. A nitrogen starved plant is yellowish or light green in colour and remains stunted such a plant ripens pre-maturity and gives poor yield.

It is evident that very little work has been done in India on these aspects as related to production and quality of leaves. So the present research project has been planned to obtain the detail information on the effects of manurial treatments on the growth yield and quality of betel leaves. The results obtained and information gathered from this investigation will certainly be of great help to the betel growers in increasing their income by manyfold ways in different regions. Hence, present investigation was conducted to study the effect of NPK on growth, yield of leaves and quality of betelvine with following objectives.

1. To study effect of nitrogen, phosphorous and potash on growth, yield of leaves and quality parameters.

2. To assess the optimum level of nitrogen, phosphorous and potash separately on betelvine cultivation.
3. To study the effect of interactions among NP, NK, PK and NPK if any on betelvine cultivation.