INTRODUCTION
Betel leaf or 'pan' in vernacular is closely related to history, culture and religion of our country. In our daily life it is very commonly used as a symbol of hospitality, as a token of love and as an after-meal breath sweetener.

Betelvine (Piper betle L.) belonging to the family Piperaceae is favoured by tropical forest conditions which provide cool shade with intermittent light, considerable humidity and adequate supply of moisture in the soil. Such conditions are available in the Bassein tracts of Maharashtra, hilly regions of Kerala and Assam including other north-eastern states like Manipur and Tripura where it is grown under natural conditions. The vines are grown in open conservatories using live-stakes like Sesbania grandiflora and Erythrina indica in peninsular India.

The conservatories are erected with elaborate arrangements to protect the vines from dessiccating hot winds ('LOO') during summer months, frost and cold during extreme winter.

In Uttar Pradesh betelvine is grown as a commercial crop in about 14 districts and more extensively in Mahoba area. Mahoba (25°19'N latitude and 79°53'E longitude) has been famous for quality 'pan' (betel leaves). It has been cultivated from ninth century and has emerged as an important cash crop in the area. The betel leaves are
Fig. 1: An outside view of betel vine conservatory.

Fig. 2: An inside view of betel vine plantation.
good in quality, crisp, fibreless and excellent in flavour. The leaves are exported to Pakistan and several gulf countries and earn valuable foreign exchange. However, in recent years betelvine cultivation has considerably declined due to various diseases infecting the vines.

Dastur (1925) recorded a serious foot rot disease during rains causing losses in 80% betelvine plantations in Durg area. According to a study conducted in Assam, diseases caused heavy damage, the percentage mortality was 2-47% due to *Phytophthora parasitica* and *Sclerotium rolfsii* (Chowdhury, 1945). Singh and Chand (1973) have recorded 44-86% (mean 67.86%) mortality of betelvine due to *P. parasitica* in Jabalpur region. Mehrotra and Tiwari (1976) observed that the farmers continued to face heavy economic losses every year due to scourge of diseases.

Although no standard techniques for disease appraisal and loss assessment models have been developed, it is believed that losses due to *Phytophthora* may range from 30-100% (Saksena, 1977) and from 5 to 80% due to *Sclerotium rolfsii* (Maiti and Sen, 1979). The fact that betelvine is propagated vegetatively also increases the possibility of plant-borne diseases (Chaurasia et al., 1980).

During sixties, the Pandariba in Mahoba received an average of about 120 quintals of Cv. Desawari leaves per day and approximately
twenty five thousand people were engaged in its cultivation. However, in 70's the trade was about 60 quintals per day only, the production as well as area of cultivation having been decreased. After 1970, various diseases affected the crop resulting in fast reduction in the cultivation and the average arrival in the market was reduced to six quintals per day. This fast decline in production of betel leaves caused problems to the growers and their livelihood was seriously jeopardised. The diseases in endemic form recurred year after year. According to a survey carried out by the institute during 1978-79, about 70% plantations (barejas) were completely wiped out by various diseases such as foot and leaf rot, stem rot and bacterial leaf spot and wilt, pests etc. About 35% plantations were completely damaged by Phytophthora parasitica, 25% by Sclerotium rolfsii and 10% due to other pathogens. In view of this, the need for investigating the diseases affecting betelvine and their management so as to make suitable recommendations to the betelvine growers in the area was apparent.

As a first step in the study of betelvine diseases, a survey was conducted covering almost all betelvine conservatories in the area to identify the key diseases causing damage to the vines. The possibility of minimising the loss due to diseases by devising control measures was explored. Several new plant products and chemical formulations were screened against betelvine pathogens in the laboratory. Fungicides and antibiotics trials in the field were carried out over three years to determine the efficacy of certain fungicides in the
management of key diseases. In an attempt to study the intensity of disease incidence in relation to manurial application, a trial was carried out using NPK fertilizers. In order to educate the betel-vine growers on the efficacy of pesticides in minimising losses due to pests and diseases, demonstration trial in 20 growers' field was carried out over three years to demonstrate the efficacy of pesticides as also the cost-benefit ratio of diseases management.

It has been shown that study of factors such as manuring, collateral hosts, mechanism of infection etc. will help to devise appropriate control measures. It was therefore, of interest to investigate mechanism of infection by betelvine pathogen Phytophthora parasitica. The collateral hosts which lodge the pathogens and pests were also noted and identified. Varietal trial was carried out to study the field susceptibility of cultivars to key diseases.

The present study of betelvine diseases and their management in Mahoba forms part of the investigations being carried out by the National Botanical Research Institute, Lucknow for the past few years under an operational Research project on Improvement of Betelvine Cultivation in Mahoba and is to our knowledge, the first detailed report on the subject.