INTRODUCTION

Mushrooms appeal to different people in different ways. Biologist is attracted by the variety of species and their place in the economy of nature; artist or photographer delights in their infinite variety of form and colour; medical research worker may look to them hopefully as a possible source of new drugs; but to most people the quality that first arouses the interest in them is their use as food. The fact that some of the larger fruit bodies of the higher fungi are edible while others are poisonous was doubtless discovered by prehistoric man far back in the dim distance of the remote past and the practice of their use as food is probably as old as man himself. Hunger and curiosity are strong motives and the times of scarcity have been the rule rather than exception in the early history of man. It is certain therefore that early man must have sampled anything of a biteable nature.

Fungi have been regarded by some at least as old as the Devonian rocks, supposed to have been laid some fifty million years ago. Numerous references in classical writings have shown that both edible and poisonous species were well known to the Babylonians, Greeks and Romans. They are also mentioned in Egyptian hieroglyphics and figured on ancient monuments.

The first classical reference to these fungi occur in the writings of Euripides and Hippocrates about fungus poisoning in the fifth century B.C., while the first
philosophical reflections on the nature of the fungi are those of Theophrastus (300 B.C.). It is clear from these early writings that not only they were eaten on a fairly large scale but some were articles of commerce and a large number of fungi known to Romans and Greeks have been identified with a greater or lesser degree of certainty. The use of fungi as food has been continued during mediaeval times and finds reference in many of their publications. The early history on the use of fungi has been reviewed by a number of workers (Houghton, 1896; Buller, 1915; Rolfe & Rolfe, 1925 and Ramsbottom, 1943). The oriental use of mushrooms is probably older than the European (Lambert, 1938).

The utilization of different fungi as food during the modern times has definitely increased with the acquisition of more knowledge about the edible and poisonous species and the development of cultivation methods of a few. In many regions of Europe and Asia mushrooms and truffles are gathered every year in quantities and pickled or salted for use during the winter or sold fresh in the markets. In most continental European cities wild forms sold in public markets are subjected to careful scrutiny to exclude any poisonous forms and Puggar (1915) estimates the sale of wild mushrooms in Munich during 1901 at 1,850,000 pounds. France, Poland and Czechoslovakia are probably the most mushroom conscious countries with Italy as a close fourth. Though the use of fungi as food increases during war or famine but in certain parts of Russia they definitely form the basis of sustenance for some sections of people. The only vegetable food of natives of Tierra del Fuego is Cyttaria darwinii.
differ greatly in their preference and prejudices for different species of edible fungi, while many countries of the Europe delight in having fleshy species; in many parts of Asia, hard woody fungi are species of choice. Eating habits of edible mushrooms of different countries have been surveyed by a number of workers (Rolfe & Rolfe, 1926; Ramsbottom, 1943; Singer, 1961). Rolfe and Rolfe (1925) records the early use of following mushrooms in India: Agaricus campestris, Morchella esculenta, Helvella crispata, Hydnum coralloides, Hypoxylon vernicosum and Polyporus mylittae.

Among the most prized of the wild mushrooms are the species of Morchella which are commonly referred to as Morels, sponge mushrooms or spring mushrooms. Morels have been appreciated as food since classical times, and Rolfe & Rolfe (1925) derives the word from German 'morhila' and French 'morille'. From classical references it has been supposed that 'spongiae' of Pliny and 'spongioloi' of Apicius were names for Morchella esculenta and allied species. The earliest historical reference to use of morels as food is made by Evelyn in 1644 and it has been the edible mushroom of choice ever since in many countries (Rolfe and Rolfe,1925).

The morels have been collected and eaten in India from time immemorial and Rolfe & Rolfe (1925) records that Mohammedans used to eat morels only as they considered other kinds to be impure food. Cooke (1870) was the first to describe morels from Kashmir and the earlier records he mentions in his note point to the inescapable conclusion that Kashmir has been the main centre of supply of these in
India since early times. Even today the morels in India
for internal consumption and export markets come mainly
from Kashmir. Out of an average estimated annual production
of 25,000 kg. of dried morel mushrooms in India, 20,000 kg.
are produced by Jammu & Kashmir (vide, paper contributed to
All India Seminar on Mushrooms Solan - 1971, by Directorate
of Marketing and Inspection, Government of India).

The demand for morels in internal and foreign markets
is ever on the increase, while the production is limited.
Morels constitute over ninety percent of the mushroom trade
of the country and more than ninety five percent of the
exports of the commodity from India. India has virtually
the monopoly in the export of morel mushrooms in the world
with Pakistan as the only potential rival. Switzerland and
France are the two major importing countries. 27,000 kg. of
morel mushrooms were exported from the country during 1962-70
earning a foreign exchange of Rs.38,72 lakhs, and the value
obtained over a number of years has shown a significant
improvement due to keen demand and limited supplies (Directorate
of Marketing and Inspection, Government of India paper - 1971).
Dried morel mushrooms are sold at a high retail price of
Rs.105-115 per kilogramme in the internal markets. The morels
are found in the market during early spring, but the supply
is limited because they have only a short season and
production in the natural habitat is dependent upon a number
of environmental factors chiefly precipitation.

Man has long been interested in cultivating morels
for food because of their excellent flavour (Nugger, 1915;
Rolfe & Rolfe, 1925; Lambert, 1938 and Gray, 1959). The conditions favourable for ascophore development however have not been determined fully and no one has attained more than sporadic success in the production of fruiting bodies. Christensen (1943) maintained that anyone who succeeds in growing morels commercially will have a veritable gold mine. Gray (1959) felt that the problem is exceptionally challenging one in the field of applied mycology and discovery of a successful method of morels will give a big fillip to mushroom industry.

In view of the continued interest of the scientists and growers all over the world in the cultivation of morels and limited supply of the same from wild sources, it was considered desirable to investigate the problem from many angles. The fact that Kashmir forests are the main source of morel (Guchhi-vern, name) supply in India have heightened the interest and raised hopes that such a study will yield some valuable results.

During the present investigations the local areas were surveyed for morels, collection made, identified and cultures for experimental work obtained. Cultivation studies under outdoor and indoor conditions were conducted. Chemical composition of the various soil samples in relation to morel growth was determined. Cultural and physiological studies were also made. Local strains were evaluated for production under submerged culture conditions. Nutritional status of morel fruit bodies and mycelia were also determined.