Scope of Investigation
2. SCOPE OF INVESTIGATION

Plants have a strong impact on human health for they are used both as food and medicine. Apart from their use in traditional medicines for thousands of years, they are also extensively used as food preservatives and flavourings and extensive literature is available on the preservative, nutritional and health benefits of these culinary plants apart from their flavour and aroma contribution. Although one gram of fat provides us with nine calories of energy, considerably more than that is provided by the same level of protein or carbohydrate, its composition associated health benefits are much debated one. Recently there is an increasing trend towards the use of vegetable oils, as a replacement for animal fats, for the purpose of frying/cooking practices and in particular routine south Indian cooking includes use of culinary oils and spices is an inevitable and a major component. In this context it has become imperative to understand whether these culinary spices retain their beneficial effects such as antioxidant activity even after heat processing. Moreover, oils of plant origin are associated with the inherent threat of microbial contamination. While the outcomes of previous/ current research initiatives leads to better understanding of nutrient and food allergy associated heath risks, vulnerable peoples, ways of prevention or mitigation of their symptoms, much research needs to be conducted on microbial toxins associated with these plant oils. Further many large-scale epidemiological studies have led to the understanding that the health benefits of culinary plants are attributed by the constituent multiple bioactive molecules which are not achievable by any single component.

Traditionally spices are added along with oil while frying, a common practice meant for flavour enhancement and detoxification. Various studies have also established the antioxidant potentials of these spices and suggest them as good natural replacements for synthetic ones used in food industry. However, these spices have not been evaluated for their role in reducing the mycotoxin-associated risk. Whereas, the threats associated with storage fungi, particularly xerophilic fungi have not yet been well established in ground nut.

Since the herbal mixed products dominates the markets and number of spices are known to have antimicrobial activity, the present study was desired to determine
the level of contamination by aflatoxigenic xerophilic fungi, their isolation, molecular
characterization and ecological adaptation in groundnut and its oil. Further it was also
intended to evaluate spices, which are considered as safe by GRAS standards, towards
reducing the aflatoxigenic fungi associated risk. Moreover the innumerable number of
phytochemicals and the limitations of available techniques in elucidating the
synergism between them in solutions indicate scope for the application of omics
technologies towards determination of potential global effects of interactions in
mixtures. In addition knowledge generation on regulatory proteins with regard to their
aflatoxin biosynthetic regulatory gene binding character and their manipulation will
advance our knowledge on signal transduction pathways regulating secondary
metabolism besides designing suitable antiaflatoxigenic compounds.

The hypothesis is that the uses of culinary plants during oil frying may have
the toxigenic mold growth inhibitory, aflatoxin detoxification, nutraceutical and
extension of oil shelf life activity. So it is worth to investigate on whether such wide
ranges of benefits are associated with the extensively used groundnut oil.

In this context, the present study include the following specific objectives

1. To determine the quality of cooking groundnut oil available in the
market.

2. To assess the level of aflatoxigenic fungal and its aflatoxin
contamination in commercially available refined and unrefined oil.

3) To isolate, characterize and determine the ecological mode of growth
of toxin elaborating fungi.

4) To determine the inhibitory activity of the commonly used spices on
growth and toxin production by aflatoxigenic fungi

5) To elucidate the phytochemical profiling of spice extracts having
inhibitory activity.

6) To establish the role of spices in the keeping quality and toxin
detoxification.

7) To determine the mode action of the bioactive principles of spice
through molecular methods.