THE STUDY OF THE GEMMISPHERE MYCOFLORA OF BUCKWHEAT (*FAGOPYRUM ESCULENTUM* MOENCH.)

D.K. Jain, Shagufta Naaz, Reena Bansal and P.N. Singh

Department of Botany, Meerut College, Meerut

Abstracts : Frequently encountered fungi in all the phases of bud development were *Alternaria alternata, Aspergillus flavus, A.niger, Candida albicans, Chaetomium globosum, Cladosporium herbarum, Nigrospora sphaerica, Penicillium frequentans, Trichoderma viride* and *Trichothecium roseum.* Among which *Aspergillus flavus, A. niger, Candida albicans* and *Cladosporium herbarum* were by far most prevalent.

Keywords : Fungi, Mycoflora, Buckwheat

INTRODUCTION

The phylloplane is a natural habitat which represents a heterogeneous population comprising of both pathogens and non-pathogens. Leaves are bounded by an environment which is rich in microbial propagules. The study of gemmisphere mycoflora has been made because it is thought that buds may be a source of propagation of the fungi that are formed on the surfaces of the above ground parts of the plant.

MATERIAL AND METHOD

Since there is so much diversity of structure and activity of buds, it is not possible to define properly a typical bud. In the present study, arbitrarily 1.5 cm long unfolding leaf was considered as bud. The buds were selected from apparently healthy plants growing in the experimental plots of the Botany Department of Meerut College, Meerut. To all external appearances the buds were normal and perfectly formed . Ten fully expanded terminal buds were collected freshly in the field, kept in sterilized polythene bags and brought immediately to the laboratory. The buds were placed in 250 ml Borosil conical flasks containing 100 ml of sterilized distilled water. The flasks were hand shaken for 20 minutes to get a homogeneous suspension of the fungal propagules. From this 1 ml of suspension per Petri dish was added into each of 10 sterilized Petri dish of 9 cm diameter. CDYA (Czapek's Dox Yeast Extract Agar) medium was added in dilution plate method.

Now the buds were removed from the flasks and were surface sterilized by dipping in 1 : 1000 aqueous mercuric chloride solution for 2 min followed by 15 rinses of sterilized water. The buds were divided in two lots of 5 buds each. The implantation of 5 buds were made in sterilized solidified CDYA medium. All the Petri dishes were incubated for 7 days at 25 $\pm$1 ^{0}C after which colonies were identified, counted and recorded. The other lot of buds (5) were splitted with the help of sterilized scalpels and needles, one portion of which was cultured on the medium and the other portion was used for histopathological study. Numerous free-hand sections were prepared with the help of sterilized razor. The sections were examined immediately after staining with lactophenol-cotton blue combination, mounted on slides and examined immediately under the compound microscope and data were recorded.

OBSERVATION

The data recorded is shown in Table 1.

Table 1. Mycoflora isolated from vegetative buds of *Fagopyrum esculentum* .

Name of fungi	Dilution plate method (Av. no. of colonies cm^{-2} leaf surface)	Surface – sterilized method (frequency %)	Dissected bits of buds on medium (frequency %)
Alternaria alternata	10.4	-	-
Aspergillus flavus	35.2	8.3	10.2
A.niger	30.2	8.1	-
Candida albicans	18.4	2.2	-
Chaetomium globosum	5.2	-	8.6
Cladosporium herbarum	20.4	5.2	10.6
Nigrospora sphaerica	5.2	-	-
Penicillium frequentans	5.2	-	-
Mucor racemosus	7.8	-	-
Trichothecium roseum	5.2	2.5	8.2
Trichoderma viride	3.2	-	4.2

Above table shows that :
1 . Maximum fungi were isolated on vegetative buds, by dilution plate method.
2 . *Aspergillus flavus, A.niger, Candida albicans* and *Cladosporium herbarum* were prevalent on vegetative buds.

DISCUSSION

The bud appears to be most favourable area for the growth of the microorganisms. The bud of *Fagopyrum esculentum* consists of loosely bound outer parts and inner region where the shoot parts are closely packed. The cross section of the bud shows spaces between bud parts; these areas would seem suitable for microorganisms. The surfaces of the bud are moist. The bud is totally dependent on other parts of the plants for nutrients. It is probable that some of these nutrients are available for growth of the microorganisms in wet spaces among bud parts.

A few workers (Keener, 1950; Leben, 1961, 1969, 1971; Davenport, 1968, 1969; Hislop and Cox, 1969 ; Naaz , 1992) have studied "gemmisphere" microflora of a variety of plants. The important role of the apple bud in the seasonal cycle of epiphytic yeasts in England was indicated by Davenport (1968, 1969). The dormant fruit bud contained approximately the same types of yeasts found on the mature fruit, indicating that the bud was an overwintering reservoir. The flora of blossoms and young leaves was modified by addition of yeasts from air and insects. Hislop and Cox (1969) examined expanding apple buds as part of their study of phylloplane fungi and yeasts. A white non-filamentous yeast represented 80-90% of the yeast and fungi isolated. The white yeast was found on leaves later in the season. Other yeasts and yeast like fungi were in expanding buds. Keener (1950, 1951) found few fungi in dormant and opening buds of a variety of trees.

Majority of fungi found inhabiting in the buds of *F. esculentum* studied during this investigation belong to the Deuteromycotina. The fungi most frequently encountered on buds in all phases of development were *Alternaria alternata* , *Aspergillus flavus, A. niger, Candida albicans, Chaetomium globosum, Cladosporium herbarum, Nigrospora sphaerica, Penicillium frequentans, Mucor racemosus, Trichothecium roseum* and *Trichoderma viride.* Among which *Aspergillus flavus, A .niger, Candida albicans* and *Cladosporium herbarum* were by far most prevalent. This investigation has demonstrated that seemingly non - pathogenic fungi inhabit and may be isolated from buds , even though these structures appear to be normal and fully developed and show no external or internal abnormalities or symptoms of disease. The possible regular existence of a mycoflora within the vegetative tissue is therefore indicated . After surface sterilization of the buds , the fungi isolated were *Aspergillus flavus, A. niger , Candida albicans, Cladosporium herbarum* and *Trichothecium roseum* . When the buds were dissected, sectioned and put on the culture medium , the fungi harvested were *Aspergillus flavus , Chaetomium globosum , Cladosporium herbarum , Trichothecium roseum* and *Trichoderma viride.* When the sectioned preparations were observed under microscope after staining with lactophenol – cotton blue, it was noted that one and two celled chlamydospore like bodies in the intercellular spaces were present. Usually these structures were attached to the tips of a very thin hyphae. However, these structures could not be harvested on nutrient medium used in the present study. After surface sterilization and sectioned materials showed endophytic hyphae and other fungal structures in the vegetative tissues of buds indicate that microorganisms were actually resident within the bud. Isolation of non-pathogenic fungi from buds suggests that the organisms were present from the initial stages in the development of the structures in which they were found. Since all of these structures arise in buds and foliage also, it may be assumed that the concept that the normal buds are possible areas for the residence of non-pathogenic fungi.

REFERENCES

Davenport, R.R. (1968). Rep. Agric. Hort. Res. Stn. , Univ. of Bristol (1967), pp 76 – 77.

Davenport, R.R. (1969). Rep. Agric. Hort. Res. Stn. , Univ. of Bristol (1968), pp 100-101.

Hislop, E. C. and T.W. Cox (1969). Effects of captan on the non-parasitic microflora of apple leaves. Trans. Br. Mycol. Soc. 52 : 223-235.

Keener, P.D. (1950). Mycoflora of buds. I. Results of cultures from non-irradiated materials of certain woody plants. Amer. J. Bot. 37: 520-527.

Keener, P.D. (1951). Mycoflora of buds. II. Results of histological studies of non-irradiated buds of certain woody plants. Amer. J. Bot. 38 : 105-110.

Leben, **C**. (1961). Microorganisms on cucumber seedlings. Phytopathology 51: 553-557.

Leben, C. (1969). Colonization of soybean buds bacteria: observations with scanning electron microscope. Can. J. Microbiology 15: 319-320.

Leben, **C**. (1971). The bud in relation to the epiphytic microflora. In Ecology of. Leaf Surface Micro-organisms. (Eds. T. F. Preece and C. H. Dickinson). pp 117-127. London : Academic Press.

Naaz , Shagufta (1992). Phylloplane mycoflora of Fagopyrum esculentum. Ph. D. thesis, Univ. of Meerut, Meerut.