V. SUMMARY
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The results of the present findings are summarised as follows:

'Kalajoha' a local sali variety of rice is taken during the course of investigations. 'Fertilizer' is applied according to the recommendation of the Directorate of Extension Education, Assam Agricultural University (AAU) for the local sali variety of this area. Nitrogenous fertilizer 'urea' is used in the present studies.

During the course of investigations analyses of microfungi are made in both the nitrogenous fertilizer treated and the nitrogenous fertilizer not-treated rice field soils.

(i) An analysis of microorganisms in the rice field soils is carried out. The results of analysis reveal that bacteria, actinomycetes and fungi are present in the rice field soils. The application of nitrogenous fertilizer changes the quantitative nature of microbial population in the rice field soils. The higher number of bacteria, actinomycetes and fungi are recorded in the rice field soil treated with nitrogenous fertilizer than in the rice field soil not-treated with nitrogenous fertilizer in different months of the year. Microorganisms of rice field soils fluctuate in different months of the year. Bacterial population is highest in the month of July in both nitrogenous fertilizer applied and
nitrogenous fertilizer not-applied rice field soils. Fungal colonies are higher in numbers in the months of October, November and again in June and July of the year. Actinomycetes population is found in abundance during the months of January-February. Lowest number of microbial population is recorded during the months of August-September of the year. It is observed that the microorganisms of rice fields gradually decrease with the increasing depth of soil.

(ii) The qualitative and quantitative nature of microfungi of rice field soils are studied. The quality and quantity of microfungi of rice field soil are affected by the application of nitrogenous fertilizer. A large number of fungi are isolated from the rice field soils applied with nitrogenous fertilizer and from the rice field soils not-applied with nitrogenous fertilizer of this area. The types of fungi isolated are - Aspergillus, Penicillium, Periconia, Mucor, Rhizopus, Torula, Phoma, Papularia, Hemicola, Chaetomium, Syncephalastrum, Curvularia, Nigrospora, Cladosporium, Pythium, Trichoderma, Fusarium, Cephalosporium, Verticillium, Alternaria, Botrytis, Stemphylium, Trichothecium, Spicaria, Helminthosporium, Gaeocladium. The experimental results show that there are qualitative and quantitative variations in the number of fungal colonies in different months of the year. The application of nitrogenous fertilizer increases the fungal population in the rice field soil. The incidence of occurrence of different
types of fungi in the rice field soils applied with the nitrogenous fertiliser and in the rice field soils not-applied with the nitrogenous fertilizer, during the year sterile mycelium represents the highest, percentage being 3.9% and 3.6% followed by *Penicillium simplicissimum* (oudemans) Thom (3.5% and 2.9%); *Penicillium sp.* (3.4% and 2.7%); *Cladosporium herbarum* (persoon) Link (3.2% and 2.4%); *Helminthosporium oryzae* Breda de Hann (2.7% and 1.9%); *Aspergillus niger* van Tieghem (2.3% and 1.7%); *Aspergillus flavus* Link (2.3% and 1.6%); *Trichoderma viride* pers (2.2% and 1.6%); *Fusarium solani* (martius) Appel & Woolen Weber (2.1% and 1.4%) and others. The population of fungi varies according to the different depths of the rice field soil.

(iii) In the present investigation the rhizosphere microflora of rice ('Kala joha' variety) is analysed. The number of bacteria, fungi and actinomycetes estimated higher in the rhizosphere than in the non-rhizosphere soil. The application of nitrogenous fertiliser influences the rhizosphere microflora of rice. Significant changes in the number of bacteria, actinomycetes and fungi at different ages of the crop are observed. Microbial population is recorded more in number in the rhizosphere soils treated with the nitrogenous fertiliser than in the rhizosphere soils not-treated with the nitrogenous fertiliser. Of the fungal types recorded are higher in number in the rhizosphere soil treated with the nitrogenous fertiliser.
than in the rhizosphere soil not treated with the nitrogenous fertilizer, *Penicillium* represents the highest percentage being 8.8% and 8.1% followed by *Aspergillus* (8.6% and 7.8%); *Fusarium* (8.0% and 7.0%); *Cladosporium* (6.9% and 6.6%); *Trichoderma* (6.7% and 6.0%) and others. Fungi like *Aspergillus*, *Penicillium*, *Fusarium*, *Trichoderma*, *Cladosporium*, *Pythium*, sterile mycelium are isolated throughout the season of the crop whereas *Curvularia*, *Mucor*, *Rhizopus*, *Alternaria*, *Papularia*, *Episaria*, *Helminthosporium*, *Phoma*, *Torula*, *Periconia*, *Nigrospora*, *Morterilla*, *Coniothyrium*, *Verticillium*, *Chaetomium*, *Hymicola*, *Memnoniella*, *Thielaviopsis* are found in some stages of the crop. Some fungi show greater affinity towards the rhizosphere region and some others are found in large number in the non-rhizosphere soil of rice.

(iv) The metabolic activity of rice field microflora is reduced due to the application of nitrogenous fertilizer. It is observed that the reduced metabolic activity has no effect on the quantitative nature of microflora occurring in the rice field soils.

(v) Various types of fungi are found to be associated with the different stages of decomposition of rice stubble in the field. The quality and the quantity of fungi are different in different stages of decomposition. The application of nitrogenous fertilizer in the rice field soil influences the
fungal population in different stages of decomposition of rice stubble. The number of fungal colonies (142) are recorded highest in the rice stubble collected after 45 days of harvest from the rice field soil treated with nitrogenous fertilizer. The types of fungi are same in between the rice stubble collected from the rice field soil treated with the nitrogenous fertilizer and the rice field soil not treated with the nitrogenous fertilizer. A total of 21 different types of fungi are isolated by the dilution plate technique. Fungi which are predominant in the rice field soil are also found predominantly associated with the different stages of decomposition of the rice stubble in the field. It is observed that the application of nitrogenous fertilizer during rice cultivation not only affect the fungal population in the rice field soil but also affect the fungal population in different stages of decomposition of the rice stubble in the field.

Of the types isolated from the rice field soil and in the different stages of decomposition of rice stubble the predominantly occurring fungi are - *Aspergillus niger* van Tieghem; *Aspergillus nidulans* (Edam) winter; *Aspergillus flavus* Link; *Penicillium simplicissimum* (oudeïmans) Thom; *Cladosporium herbarum* (persoon) Link; *Trichoderma viride* pers; *Fusarium solani* (Martius) Appel & Woolen Weber; *Fusarium semitectum* Berkeley & Ravenel; *Verticillium* sp.; *Helminthosporium oryzae* Breda de Hann; *Mucor flavus* Bainier; *Rhizopus* sp.; *Sterile mycelium*. 
(vi) Microfungi isolated from the rice field soils cause considerable degradation of rice stubble. Aspergillus flavus Link shows maximum degradative ability (27.31%) after 60 days of incubation. Of the fungi inoculated the highest degradation of lignin and holocellulose are found by Penicillium simplicissimum (oudemans) Thom (16.92%) and Aspergillus niger van Tieghem (33.01%) respectively after 60 days of incubation. It is observed that the extent of decomposition of lignin by the fungi is lower than that of the holocellulose of rice stubble.

(vii) The present study shows that the microfungi inhabiting in the rice field soils are capable of solubilizing insoluble phosphates in vitro. The amount of soluble phosphate is higher in the liquid media where tricalcium phosphate is added in comparison to other phosphatic compounds. Of the fungi inoculated Aspergillus nidulans (Bidam) Winter (48.93%) and Aspergillus niger van Tieghem (46.56%) are found to be capable of solubilizing appreciable amounts of all the insoluble phosphates used in the present study. The degree of solubilisation is favoured by change in pH.

(viii)(a) The effect of nitrogen and the culture media on the growth and sporulation of predominant microfungi of rice field soil are observed during the investigation.
(i) All the inoculated fungi show maximum growth in case of urea as nitrogen source. Sporulation is highest in ammonium sulphate as nitrogen source.

(ii) Results indicate that microfungi of rice field soil grow best in Czapek's liquid medium. Majority of the inoculated fungi show excellent sporulation in Czapek's medium.

(b) The effect of temperature, pH and relative humidity on the growth and sporulation of the fungi are studied.

(i) The inoculated fungi show their best growth and sporulation between temperature 28°C-30°C. In case of Aspergillus niger van Tieghem and Rhizopus sp., optimum growth is found at temperature 40°C.

(ii) Results show that the inoculated fungi require a specific pH range 5-6 for their maximum growth. In case of Trichoderma viride pers and Penicillium simplicissimum (oudemans) Thom the highest growth is recorded at pH 5. The maximum sporulation is noticed at pH 6.

(iii) The present studies reveal that microfungi of rice field soil require a high moisture level for their growth. All the inoculated fungi show maximum growth and sporulation at relative humidity 100%. Growth is poor at relative humidity below 92%. 
