Chengcong Lu - The saliva vitellogenin of leafhopper is an effector suppressing H2O2 in rice host.

Vitellogenin (Vg) is the yolk protein precursor and essential nutrient for oocyte development in female insects. Vg also exists in several Hemiptera insects, like leafhopper *Recilia dorsalis*, which widely distribute in rice growing countries in Asia. However, the function of salivary Vg of *R. dorsalis* is unknown yet. In this study, it was found that Vg was released into rice phloem together with saliva during leafhoppers feeding. Knocking down Vg improved the level of H2O2 and H2O2 metabolism in rice plants and increased the difficulty of leafhoppers feeding. It is suggested that salivary Vg serves as an effector suppressing H2O2 in rice host. Further studies showed the interaction between Vg and rice Sulfite Oxidase (SO), which catalyzes SO32- into SO42- and produces H2O2. Vg competed with CNX1, which is the carrier protein of molybdenum cofactor of SO, to bind SO, leading to decreased SO activity, finally reducing H2O2 level. The transgenic rice plants overexpressing Vg or knocking out SO significantly inhibited SO activity and H2O2 accumulation, and promoted R. dorsalis feeding. These findings reveal Vg of leafhopper as an effector suppressing plant resistance to insect, and shed light on understanding the function of salivary Vg of other Hemiptera insects.

Asan Mohamed B. - Correlation of Finger millet yield and organic and inorganic nutrients through Inductive cum Targeted Yield Model on Alfisol.

Finger millet cultivation in Alfisols (Typic Rhodustalf, Palaviduthi soil series) demands an optimal integrated plant nutrient supply to achieve desired yields. In order to develop the Soil Test Crop Response to fertilizer and farmyard manure (FYM) through Integrated Plant Nutrition System (STCR-IPNS) in terms of nutrient uptake, yield, and pre-sowing STVs, a field investigation on Finger millet (Eleusine coracana L. Gaertn.) has been conducted. By adopting the Inductive cum Targeted Yield Model before the test crop of Finger millet, an artificial soil fertility gradient was created by the application of graded levels of NPK fertilizers with fodder sorghum as a gradient crop. The link between the numerous independent variables and the soil nutrient levels was discovered using the multivariate model. According to the study's findings, the multiple regression model could reasonably predict the post-harvest soil nutrition in Finger millet and was best fitted with better accuracy. Insights from the study will assist farmers to choose effective nutrient management strategies by predicting the post-harvest soil nutrition in the Finger millet-based cropping sequence.

Moses Njoka Muriithi - Influence of varying soil moisture on growth and yield of Chia (*Salvia hispanica L.)* in Meru County, Kenya.

A field experiment was conducted in March-June and June-October 2021 to determine the influence of different soil moisture regimes on the growth and yield of Chia. A randomized complete block design with three replications was used. Chia plants were subjected to four soil moisture regimes; (i)watering to the seedling stage (seedling), (ii) watering to the vegetative stage (vegetative), and (iii) watering to the flowering stage (flowering) (iv) continuous watering (control). High soil moisture of 89-93 %, significantly increased (p≤0.05) the vegetative growth of Chia plants. Plant height, stem diameter

and number of leaves increased by 65-180%, 100-109% and 92-565%, respectively. 20-40% reduction in the available soil water to the plant decreased growth of Chia. Low soil moisture of 30-32 % caused plants to produce 172-220% less seed yield than control plants. Seasonal variation was noted, with increased vegetative growth and seed yield reported in the March-June 2021 season compared to the June-October 2021 season. Decreased vegetative growth and yields was a result from inhibition of cell enlargement or cell division under reduced soil moisture. The study recommends watering to the flowering stage as the best practice for water saving and increasing Chia production in Kenya.

Shreemi Prabhakaran - Ramial chipped wood: A sustainable approach to improve boreal soils in Canada.

Due to global warming and climate change, the boreal regions in Canada are becoming more accessible to agriculture. However, these soils are of poor quality because of its low organic matter content, pH, fertility and microbial activity. Application of organic amendments, specifically, ramial chipped wood (RCW) can be a sustainable option but limited information is available. A field study was conducted in Normandin, (QC, Canada) comparing five treatments, namely, (i) control; (ii) inorganic fertilizer (calcium ammonium nitrate [27-0-0], 40 kg N ha-1); (iii) liquid dairy manure (LDM) (40 kg N ha-1); (iv) LDM (40kg N ha-1) + 24 t C ha-1 as RCW; and (v) LDM (40 kg N ha-1) + 48 t C ha-1 as RCW. Each treatment was replicated four times in a randomized complete block design and soil samples were assessed for active carbon, soil pH, C:N ratio, aggregate stability, soil respiration and easily-extractable glomalin related soil protein for 2021 and 2022 respectively. Our results have shown that the application of LDM (40 kg N/ha) + 48 t C ha-1 has significantly increased ($p \leq 0.05$) all the parameters by the fall of 2022 thereby proving the potential of RCW being a sustainable long-term amendment option for imparting beneficial effects on the boreal soils in Canada.

Mengtian Pei - The balance of the evolution of *Magnaporthe oryzae.*

The recent research found that the loss of ISW2 in the rice blast pathogen exhibits a favorable phenotype, such as the absence of pathogenicity on rice leaves. Therefore, based on the above research, we aim to understand what specific function lies behind it? We found Isw2 is located between two nucleosomes and is responsible for pulling and moving nucleosomes, thereby regulating genes in the vicinity of nucleosomes. Based on the transcriptome data and CHIP data, we have found that MoISW2 appears to contribute to the adaptation to both biological and non-biological challenges. When the two nucleosomes come closer, genes that are responsible for rapid adaptation to environmental changes are silenced, leading to a slower pace of evolution. When evolution slows down, the gene-by-gene hypothesis is expected to be challenged. If the gene-by-gene hypothesis is challenged and broken, the agricultural sector may explore new genetic mechanisms and approaches to improve crop quality, yield, and adaptability, further promoting sustainable agricultural development.

Vishnu Priya Viswanathan - Effect of atmospheric pressure cold plasma processing on the quality parameters of fresh coconut Neera.

Coconut inflorescence sap is nutritious healthy non-alcoholic beverage is traditionally collected by tapping the unopened inflorescence of the coconut palm *(Cocos nucifera L.)*. It contains sugars, minerals, vitamins, protein, antioxidants, volatiles, etc. The sap has high sugar content (12–15% of the

total weight) and an enormous amount of nutrients is highly susceptible to spontaneous fermentation due to presence of yeast and bacteria and turns into alcohol drink called toddy. Non-thermal processing methods serve as a promising alternative method to inactivate microbes and reducing the detrimental effect on color, nutrition, and other functional properties of Neera without application of heat. In this regard, the cold plasma processing was selected as a non-thermal processing applied to the freshly tapped coconut inflorescence sap (Neera) in arresting the multiplication of yeast. The cold plasma processing of coconut Neera was carried out at the applied voltage in the range of 20 to 30 kV with different exposure times of 2 to 5 minutes. There were minimum changes observed in pH, TSS, sugars and color of Neera after plasma exposure whereas the results of total plate count, yeast and mold count, and lactic acid bacteria count at optimized process condition were 3.99 ± 0.14 log10 CFU/ml, 3.5 ± 0.17 log10 CFU/ml and 3.78 ± 0.08 log10 CFU/ml respectively.

Victor Kiptoo Kemboi - Effects of land preparation methods and organic soil amendments on soil properties, growth and yield of maize (*Zea mays*).

Maize (*Zea mays L.*) remains an important food crop popular in Kenya and its production has a direct influence on nutrition and economic security. In 2020-2021 maize production in Kenya was about 85% of total cereal production of which it declined by about 550,000 metric tons which was as a result of increased cost of inputs, uneven rainfall distribution and drought this impact contributed to a decline in maize consumption rate from 4-5 million metric tons to 3 million metric tons which amounts for 30% decrease. The decline is due to soil health degradation, and this is attributed by climate change. Here, we combine land preparation method and organic soil to evaluate their effects on maize growth, yield and soil physical and chemical properties. The experiment was conducted at Meru University Demonstration Farm. Conservational land preparation method and conventional land preparation method was prepared. The soil was amended with black soldier fly frass fertilizer, rice husk biochar and Trichoderma as a source of organic nutrient. The results showed that on amendment of organic nutrients soil bulk density was decreased significantly ($p<0.05$), increased soil moisture content ($p<0.05$) and increased yields of maize. The land preparation method influenced the soil moisture significantly ($p<0.05$).

Imran Hassan - Deep Learning-Based Detection of Beetles in In-Field Images for Application of Autonomous Field Scouting.

This study uses deep learning architecture for accurate detection of Colorado Potato Beetles on potato leaves in real-life conditions. This will contribute valuable insights towards the advancement of automated scouting methods, enhancing pest management efficiency in agriculture. The presentation will demonstrate the ability of image preprocessing in detecting small objects like beetles even with limited training data.