**Track1: Crop protection**

Crop protection is the science and routine of regulating plant disease, weeds and diverse vermin (both vertebrate and invertebrate) that mischief agrarian yields and officer benefit.The yield plants may be hurt by dreadful little animals, fowls, rodents, minuscule creatures, et cetera. Crop Protection continues to play a major role in achieving targets of crops production. Every year farmers may face the damage done to crops by pests and diseases, according to data of the United Nations Food and Agricultural Organization (FAO), constitutes approximately 20-25 % of the potential World yield of food crops. These discoveries will lead to the creation of “smart” plants that are more resilient to Climate induced stresses. Better understanding of the fundamental biophysical processes controlling nanomaterial–plant interactions will enable delivery of nano materials to precise locations in plants where they are needed to be active. The continuous real-time monitoring of plant heat status and the ability to combine these nano  enabled technologies with wireless soil sensors and automated water and nutrient delivery systems can lead to more precise.

**Track2: Water use efficiency and productivity**

Breakthroughs in genomics, nanotechnology, and robotics along with improvements in computational, statistical, and modeling capabilities will make it possible for scientists and producers to make well-informed, data-driven decisions. , development of high-throughput automated  phenol typing capabilities can speed the process of breeding via the use of artificial intelligence and machine learning. However, in order to successfully model, manage, and predict crop production in any given location, better information is also needed on how different cropping management systems (e.g., use of cover crops and crop rotation) influence soil properties such as water storage capacity and nutrient availability. The emerging field of plant nano biotechnology promises transformative solutions for nondestructive monitoring of plant signaling pathways and metabolism .This can increase plant tolerance (e.g., drought, disease, and soil nutrient deficiencies ), alter photosynthesis and enable plants to communicate their biochemical status.

**Track3: Gene-editing system**

The discovery of gene-editing systems (such as CRISPR-Cas9) has revolutionized our ability to both understand and genetically modify both plants and animals .For crops, new alleles can be generated and introduced directly into a cultivar of choice, leaping over the time-consuming process of making multiple crosses to combine desirable traits in the progeny. Department of agriculture introduce Gene editing creates the potential to identify and implement new traits in the field on a much faster timescale. Traditional plant breeding is slow and tedious as it can only exploit the limited quantitative trait alleles found in wild relatives, and then it can take between 7 to 12 years to utilize conventional methods to develop a new cultivar (Baenziger et al., 2006). The ability to fine-tune the expression of a quantitative trait locus rather than utilizing only what is available in wild relatives has already shown promise as a way to increase yield. For example, researchers edited genes in three pathways that contribute to productivity in tomato plants—plant architecture, fruit size, and inflorescence—to rapidly produce alleles that alter their promoters. The Knowledge of these “hitchhiking genes” is a necessary first step toward their eventual modification or elimination by gene-editing methodologies.

**Track4: Materials and methods study area:**

 The experiments were carried out at Okegun Farm in Ondo and the Teaching and Research Farm of Agricultural Science Department, Adeyemi College of Education, Ondo between August and October, 2017. Ondo is located in the latitude 70E, 05EN and longitude 40E, 55EE and at elevation of 381.3 m above the sea level. It belongs to the tropical rain forest zone. The soil belongs to the order Alfisol (U.S.D.A.) or Luvisol8 . Evidence has shown that the land had been in use for planting various crops in the past. The lands were fairly flat, slightly sloppy and contained well drained loamy soil particles with small pebbles.

**Track5 soil sampling:**

Surface soil samples (0-20 cm) were randomly collected before the conduct of the experiment at the experimental sites, bulked, air-dried and sieved through 2 mm mesh. The bulked soil samples were analyzed for OM, total N, available P, K, Ca, Mg, Fe, Cu, Zn and Mn.

**Track6 Experimental layout and design:**

The lands were manually cleared, stumped, mapped, pegged out and made into beds of 4 m by 4 m size with 0.5 m discard area. The experiments were laid out in Randomized Complete Block Design (RCBD) and replicated 3 times. The experimental treatments were total harvest (total uprooting-1 time harvest), 1st ratoon (2 times harvest ) and 2nd ratoon (3 times harvest). The total harvest means that the tagged crops were uprooted and the roots were severed from the shoot exactly 28 days after sowing, 1st ratoon means that the tagged Amaranthus tricolor were partially cut at 28 days and finally uprooted at 42 days after sowing while the 2nd ratoon means that the tagged Amaranthus tricolor were partially harvested at 28 and 42 days and finally uprooted at 56 days after sowing. Ratoon in this context means, the shoots of the selected Amaranthus tricolor were harvested manually by cutting the stem with a local sharp knife at 20 cm above ground level and the remaining shoots of the plant were allowed to develop side shoots.

**Track7 Planting of Amaranthus and cultural operation:**

Amaranthus tricolor seeds were purchased from the local market in Ondo. Sowing of seeds was done by broadcasting. The seeds were mixed with light dried soil to enhance even distribution of the seeds. The seeds were thinned to 20 stands per plot. About 10 t haG1 of fresh poultry manure was cured for 2 weeks and incorporated into all the plots 2 weeks before planting to improve the soil N, P and K content when the initial soil sample showed that the soils were deficient in N, P and K (Table 1). Weeding was done manually with hand-held hoe 2 weeks after planting.

**Track8 Plant parameters determination:**

The parameters determined were plants height, number of leaves, number of branches, leaf area, fresh weight, dry weight and moisture content. The N, P, K, Ca, Mg, Fe, Cu, Zn and Mn contents of the leaves were determined. Crude protein, fat, NFE, fibre and ash contents were also determined9 .The harvested plants from each plot were washed and transported in a well labeled envelope to the laboratory. The harvested plants were washed with distilled water and air-dried. The air-dried samples were packed inside well labeled envelopes and oven dried, at a low temperature until constant weights were recorded. The oven dried samples were allowed to cool inside a desiccator and grounded into powder. The grounded samples were then packed inside a cellophane nylon. The leaf N, P, K, Ca, Mg, Fe, Cu, Zn and Mn were analyzed from the wet digest of the leaf samples9 . The nutritional quality such as crude protein, NFE, fibre and ash content were determined using AOAC9 method. The nutrients uptake and nutritional quality of Amaranthus tricolor were determined at their final stages i.e., total harvest at 28 days, 1st ratoon at 42 days (1 time harvest) and 2nd ratoon at 58 days (2 times harvest) after sowing.

**Track9 BioDirect™ Technology:**

Our second agricultural biological technology is called BioDirect™. We are developing products that engage a naturally occurring process called RNA interference (RNAi).Like a cook adjusting a recipe for a meal, cells use RNAi to reduce the use of a specific mRNA so that just the right amount of a particular protein is made. RNAi is so specific that it can stop the production of a pigment gene so soybeans are yellow instead of black without affecting thousands of other important “recipes.”

**Track10 Plant breeding:**

Finding the one characteristic that can offer farmers an advantage is incredibly difficult and time-consuming. One main reason of plant breding is genetic diversity, Through generations of research and discovery, plant breeding has gone beyond selecting a parent plant simply based on its physical appearance and now includes an understanding of the genetic makeup of a plant. This allows plant breeders to better predict which plants will have a higher probably of success.Understanding the genetic markers in a plant’s DNA helps us know which plants carry traits that will help them combat environmental challenges like disease or drought.

**Track 11 Microbial products:**

Microbes are found in nature. For example, soil is saturated with microorganisms, and a tablespoon of soil could contain around 50 billion of them.Microbes have also been used in our food for thousands of years. From bread to cheese, yogurt, beer, wine, vinegar, soy sauce, sauerkraut, injera, kimchi, and even the preparation of chocolate. Our food is delicious thanks in part to the presence and activity of microbes. In agriculture, folks are developing products containing microbes that can be applied to the surface of seeds and complement — or provide an alternative to — chemical agricultural products.

**Track 12 Precision in farming:**

Small variabilities in the quantity of ingredients can lead to huge differences in taste and texture. Just like we use measuring cups and spoons to maintain precision when baking, farmers use data science to decide how much water, fertilizer, and other inputs are needed to grow and harvest the best crop.Data science offers huge potential for farmers; the more easily farmers can see and understand what’s happening in their field, the better able they are to make sustainable choices, both as a steward of the land and as a business owner.

**Track 13 Climate change and agriculture:**

Based on some of the past experiences indicated above, impact of climate change on agriculture will be one of the major deciding factors influencing the future food security of mankind on the earth. Agriculture is not only sensitive to climate change but also one of the major drivers for climate change. Understanding the weather changes over a period of time and adjusting the management practices towards achieving better harvest are challenges to the growth of agricultural sector as a whole. The climate sensitivity of agriculture is uncertain, as there is regional variation in rainfall, temperature, crops and cropping systems, soils and management practices. The inter-annual variations in temperature and precipitation were much higher than the predicted changes in temperature and precipitation. The crop losses may increase if the predicted climate change increases the climate variability.

**Track 14 Contigency planning:**

It is a plan devised for an exceptional risk, which is impractical or impossible to avoid. Ministry of Agriculture, through Indian Council of Agricultural Research (ICAR) and State Agricultural Universities (SAUs), is working on district-specific contingency plan for the agriculture and allied sectors. This includes fisheries and animal husbandry and started in March 2010 under Rashtriya Krishi Vikas Yojana (RKVY). Contingency plans for about 300 out of the total 600 odd districts were prepared and validated by experts and hosted in Department of Agriculture and Cooperation (DAC), ICAR, Centre for Research in Dry land Areas (CRIDA) website. The comprehensive district-specific document is having details on the crops and cultivation practices to be adopted in case of deficient or delay in monsoon, unseasonal rains, frosts or unusually high temperature, excessive rains etc. Each district is a scientific document for adaptation in case of eventualities.

**Track 15 Extention system:**

Extension system has to focus more on diversifying the livelihood options, changing suitable cropping patterns to adjust to the change which is occurring in the particular location, planting more drought tolerant crops, promoting increased share of non-agricultural activities and Agro-forestry practices, identifying the traditional coping strategies, improved on - farm soil & water conservation, promoting mixed cropping pattern and making provision for access to various information sources related to weather and other advisories of climate change would minimize the risks and certainty of farmers related to climate change.