

+a. Impact of climate change on rainfed sorghum sown at different sowing time

The spatial effect of climate change on sorghum sown at different sowing date in the near and mid-term future simulated by the CERES-Sorghum with the climate generated from ACCESS-CM2, MIROC-ES2L, CNRM-ESM2 and EC-Earth-Veg-LR is presented in Figure.... respectively....

In the near-term future, ACCESS-CM2 climate model indicates that August 18th sowing is expected to have a positive effect under climate change in the majority of places except the southern part and some parts of the north-eastern region. In most places, yield is expected to increase below 10 percent. August 25th and September 1st sowing would experience the positive influence of climate change except in a very few places, where the yield increase ranges from 5 to 10 percent in the larger portion of sorghum ECZ districts. September 8th sowing is also anticipated to face positive influence in some regions and negative influence in some regions. September 15th sowing is predicted to be affecting 50 to 60 percent of the major sorghum growing districts. MIROC-ES2L also shows the similar spatial effect of climate change in the near-term future under various sowing date. CNRM-ESM2 also demonstrates the similar trend of ACCESS-CM2, MIROC-ES2L and CNRM-ESM2 models. EC-Earth-Veg-LR exhibits the same pattern as all the climate models under various sowing times, with a higher magnitude of negative effect than the other models.

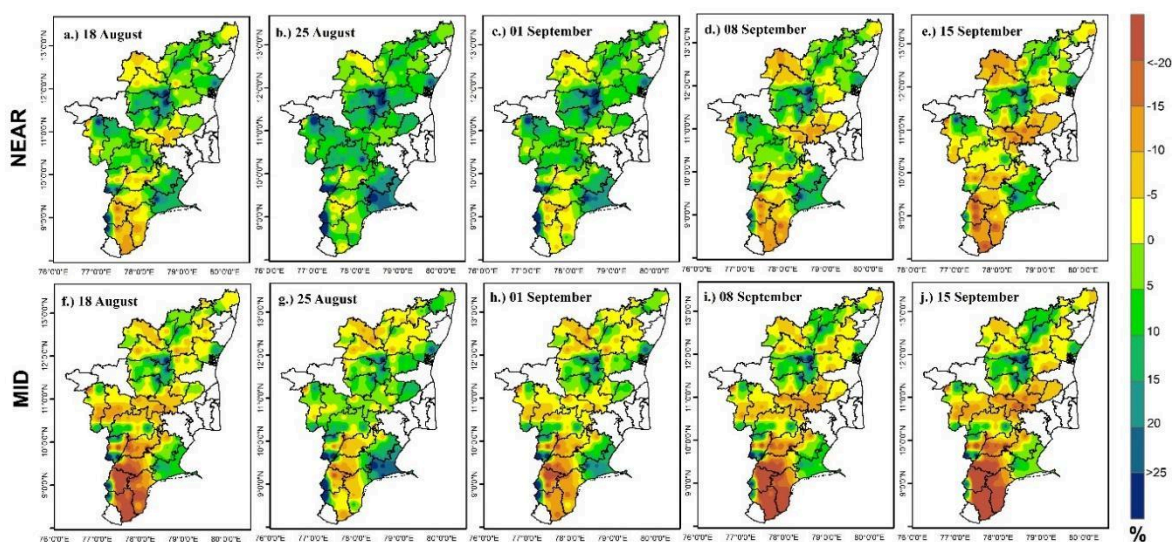


Figure... ACCESS-CM2– impact of climate change on sorghum yield under different sowing dates

In the mid-term future, all the models manifest that the regions with positive impact of climate change expected to shrink, leading to the area exposed to the deleterious influence

of climate change being expanded under all sowing date. Further, the magnitude of the negative impact is expected to be stronger, invariably, in all sowing dates.

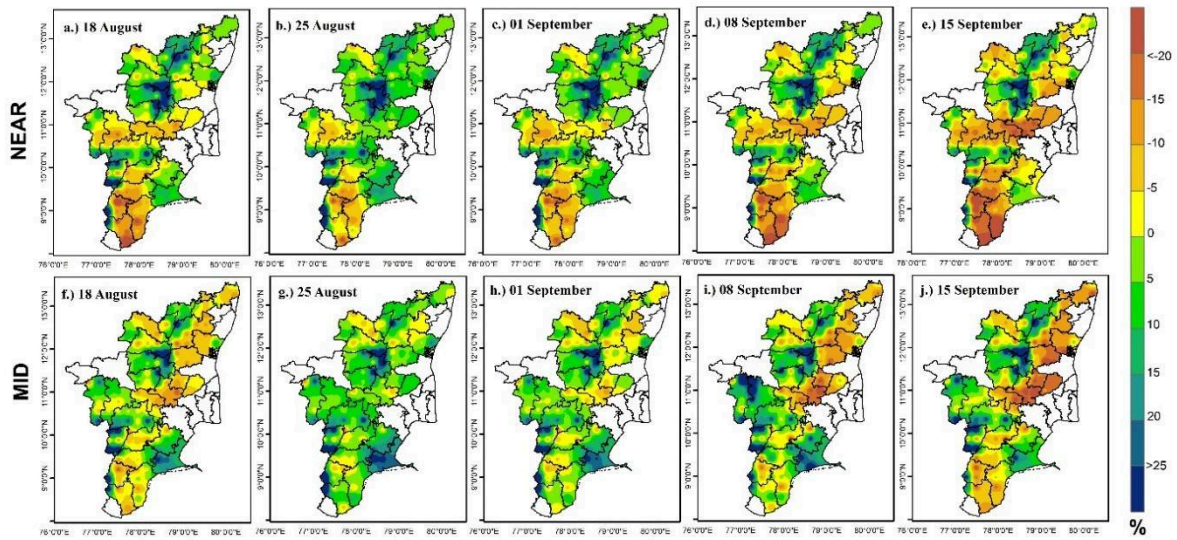


Figure... MIROC-ES2L – impact of climate change on sorghum yield under different sowing dates

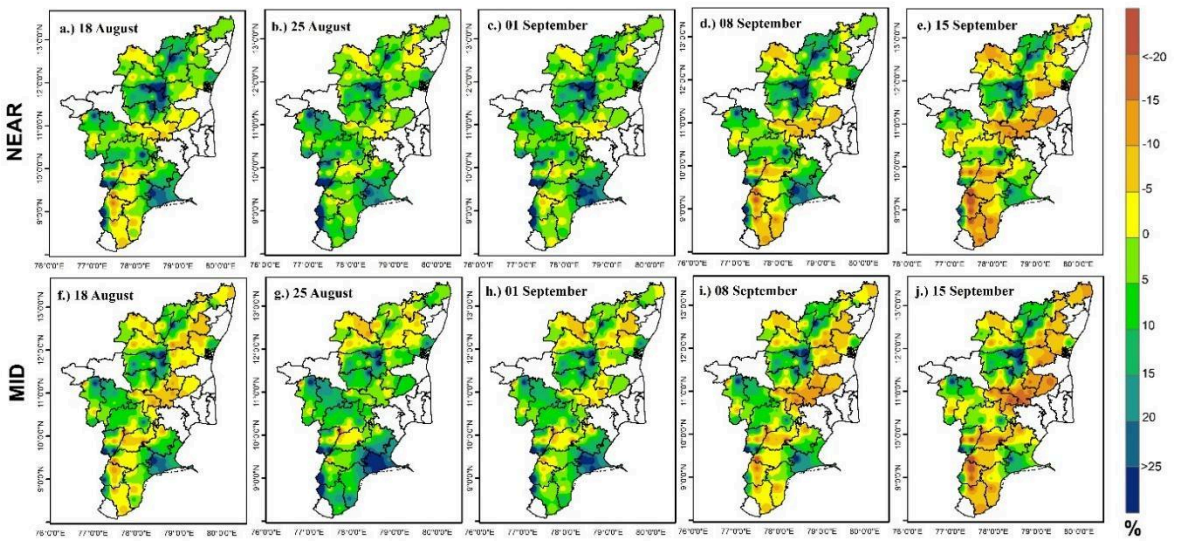


Figure... CNRM-ESM2 – impact of climate change on sorghum yield under different sowing dates

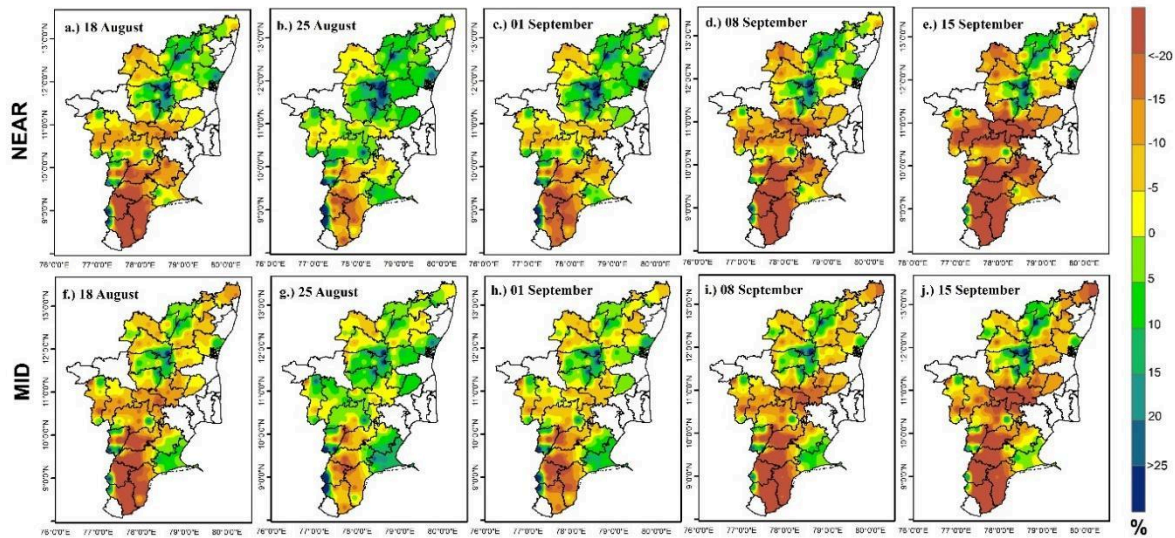


Figure... EC-Earth-Veg-LR – impact of climate change on sorghum yield under different sowing dates

b. Nutrient management

Application of nitrogenous fertilizer at an ideal quantity and time during the crop growing period coinciding with the critical phases of the crop and the active growth stage for effective fertilizer usage could improve the yield of the crop. The response of sorghum to the increased split and dose of nitrogen fertilizer was quantified under future climatic conditions to improve the yield of sorghum. Response of sorghum to increased split of nitrogen application in the near and mid-term future under different models is presented in figure...

The results of increased split application of nitrogen fertilizer to three at basal, 30 and 50 DAS with a 15 kg ha^{-1} dose of nitrogen at each split indicate that dividing the two split application into three splits helps in increasing the sorghum yield under future climatic conditions (Figure ...).

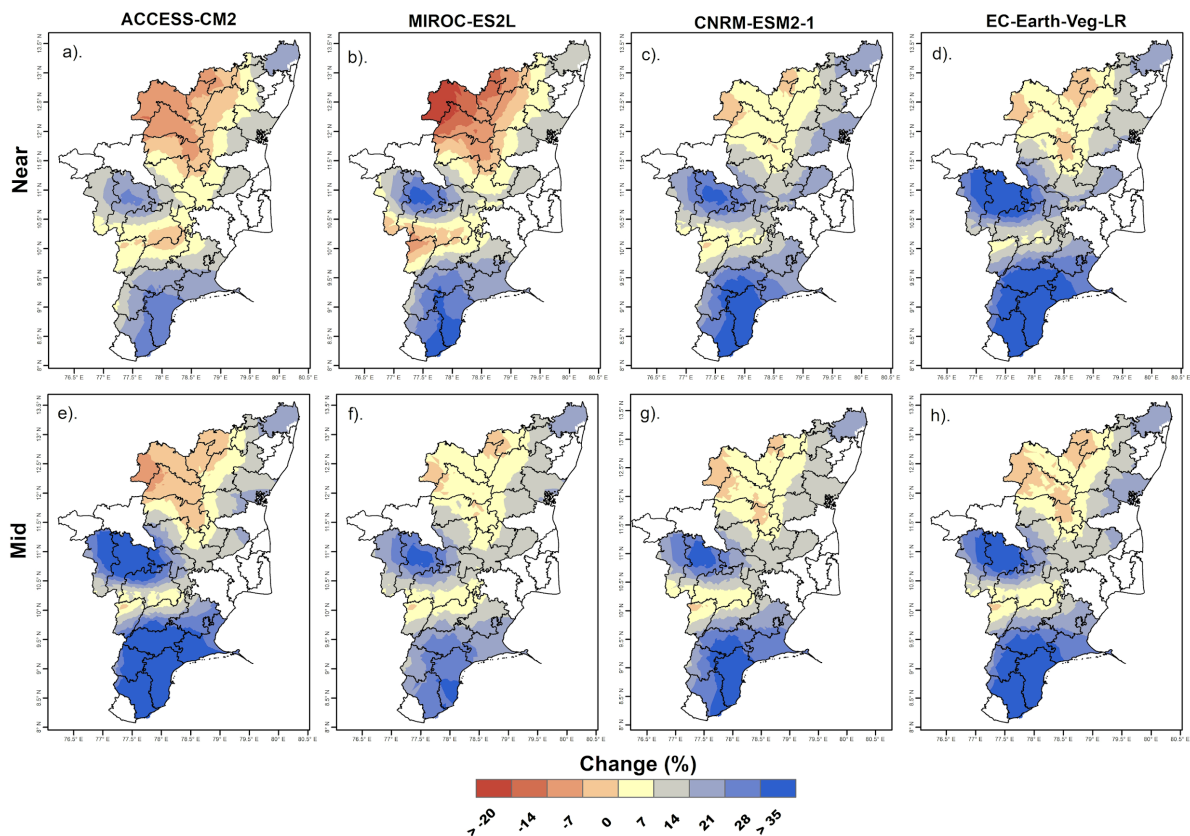


Figure ... Response of sorghum to increased split of nitrogen application in the near and mid-term future

In both near-term and mid-term future, yield is expected to increase with the increased number of splits. Dividing the recommended dose of 40 kg with an additional dose of 5 kg into three splits instead of two splits increased the yield considerably in major sorghum-growing regions except the Northwestern zone of Tamil Nadu. The yield reduction due to increased split application of N is expected to be up to 6.5 in a very few pockets in all the models and in all future time scales except MIROC-ES2L in the mid-term future. Overall, in the sorghum growing districts, increasing the number of splits in the N application would offer a yield benefit of 15 to 19 percent in the near and mid-term future. The yield increase is predicted to be above 35 percent, with an increased number of N splits in the southern and western zones of Tamil Nadu.