Maize ( Z. mays L.) is a tall, monecious annual grass cultivated in 956447 hectares of land in Nepal fetching annual production of 2,713,635 tonnes (MoAD, 2077). Its cultivation, although a commonplace practice in Nepal, has been thriving in mostly traditional form despite claiming a major share as a staple food system. Consumption trend of Maize as of 2018 as suggested by the leading national maize research organization, NMRP, informs[1](file:///C:\Users\user\Downloads\prachi_submission\maize_genotype_trial_html.html#fn1) that 22.52 % of the daily cereal uptake per capita (Hirai et al. 1993) is met with Maize. Since maize based agriculture system forms integral part of human food chain, while exhibiting prospects of continually increased contribution to dietary need supplementation, an honest step to mitigating long term food security in Nepal is investing resources to maize production and research.

A closer survey into food habit of past few years in Nepal suggests toward increasing meat consumption, especially that of poultry. Newer avenues for demand of maize as animal and poultry feed has opened. Furthermore, new types of maize-based products such as soups, vegetables and edible oils are in demand for use as food. While winter maize may be a promising technology intervention, longer growing season, extreme weather scenarios and inadequate irrigation infrastructures in major production pockets are the major hurdles to expansion of this technology.

Seasonal cultivation of maize in Nepal is generally scheduled differently for various agro-ecological zones. For instance, recommendation for optimal timing of planting in lower and higher mid-hill are is during summer second half of April/May and second half of March/April, respectively. For terai region, however, crop matures at relatively shorter growing period. Therefore, in areas with provision of proper drainage two harvests can be taken – first planted in summer on second half of Feb/March and the second planted before onset of monsoon during second half of May/June season may.

Summer season maize plantation ensures early harvest and becomes a bridge to utilize fallow period between winter and monsoon season, the latter being mostly dedicated to rice production. However, with gains come risk. Maize planted as summer crop in terai region of Nepal generally has to withstand scenario of extreme heat during vegetative-reproductive transitioning stage, unfortunately. Several studies have detailed on the ill consequences on yield components including reduced florets per ear, reduced number of viable kernel resulting due to kernel abortion, lesser silk extrusion, and reduced prolificacy of the crop that have gone through a period of high heat (Edreira et al. 2011). In contrast to biomass partitioning, severe effects were noted on final kernel number due to reduced overall biomass production under high temperature regimes (Echarte and Tollenaar 2006).

Effects of multifaceted events like climate change are being realized only recently in major cultivated crops including rice (Mukamuhirwa et al. 2019), lentil (Sehgal et al. 2017). Recent findings concerning effects of weather extremes, particularly during late vegetative and reproductive stages of the maize have underlined mechanisms that relate metabolism of upper body of crop to be detrimentally affected causing yield reduction (Zhao et al. 2016; Obata et al. 2015). Although touted a C4 plant having elaborate metabolic features that improve survival at high temperature and arid conditions, not unlike many other commercial crop maize requires a favorable growing period to realize good harvest. Shifting global climatic patterns are of major concern to countries of South Asia, notably Nepal, which traditionally have relied on low input use and mercy of good weather. As highlighted by Niyogi et al. (2015), current production systems are not sustainable and could be adversely impacted by extreme climate events in the near future.

Optimum yields occur when hybrids of suitable maturity duration and architecturally suited to dense population stand are chosen. In addition, exogenous sources of nitrogen fertilizer are generally applied and weed and insect control measures are generally recommended. Generally, hybrids are either early, medium or late maturing according to the amount of “heat units” that will be required for maturity.

Noting critical role of temperature regime during flowering and grain filling with heat stress causing severe reduction in economic yield (Barnabás, Jäger, and Fehér 2008), breeding for heat-tolerant cultivars is crucial to sustain crop production in the future. Genetic diversity analysis is imperative in crop improvement and can be studied through morphological, biochemical and molecular markers. Morphological characterization for genetic divergence among genotypes is considered an initial step (Chen et al. 2012).