5. DISCUSSION

5.1 Effects of Rice Straw Mulching on Soil Temperature and Moisture

The results indicated that rice straw mulching caused a significant effect on soil temperature throughout the crop growth period. Mulching with rice straw caused a marked reduction in 03:00 pm. soil temperature, particularly in early irrigated (1.2-2.6^{0}C), late irrigated (2.6-2.9^{0}C) and non-irrigated conditions (3.7-4.8^{0}C) as presented in Table 2. A reduction of maximum soil temperature under straw mulch was caused by its higher albedo, lowered heat transfer due to the presence of a thick air layer and higher thermal capacity due to higher soil water content (Chaudhary and Chopra, 1983). In contrast to 03:00 pm. soil temperature, rice straw mulching caused a slight increase in 07:00 am. soil temperature in all treatments (0.5-1.2^{0}C in early irrigated, 0.9-1.3^{0}C in late irrigated, 1.3-1.6^{0}C in full irrigated and 1.0-1.5^{0}C in non-irrigated treatments). As a consequence, the amplitude of diurnal fluctuation in soil temperature was relatively lower under straw mulch than in the bare soil treatment. Similar effects of rice straw mulching were also found by Wivutvongvana et al.(1991) in vegetables experiment from the same research station. As expected, diurnal soil temperature in straw mulching plots was the lowest as compared to those in plastic mulch and bare soil plots.

Though the changes of soil moisture content were comparable among bare soil and straw mulch treatments, rice straw mulching resulted in relatively higher soil moisture content as compared to bare soil. This reflected a better soil moisture condition in rice straw mulching plots. Bristow (1988) has reported previously that mulching not only caused reduction in soil temperature but also tended to reduce water evaporation from the soil.

5.2 Effects of Rice Straw Mulching on Growth of Wheat

In case of wheat growth, it was likely that a reduction of 03:00 pm. soil temperature and a better soil moisture condition in straw mulched plots favored root as well as shoot growth of the plants. This was implied by the greater nutrient (N, P and K) uptake, taller plants and higher shoot dry matter production under straw mulched treatments, particularly in late irrigated and non-irrigated treatments. Similar results were reported earlier by Bacon and Cooper (1985) and Khera et al. (1976).

Besides the effects on wheat growth, rice straw mulching also caused significant effects on wheat development. It was observed that rice straw mulching tended to prolong days to anthesis, days to maturity and consequently resulted in longer grain filling period. The delay in anthesis due to straw mulching was also found by Chaudhary and Chopra (1983). Apart from mulching, it was noted that days to anthesis and days to maturity can also be lengthened by irrigation which was consistent with the study by Musick and Dusek (1980).

5.3 Effects of Rice Straw Mulching on Wheat Grain Yield

A highly significant difference in wheat grain yields among mulching treatments was noted to be associated with the increases in spike number/m^2, spikelet number/spike and grain number/spike. However, the increase in grain number/spike was offset by significantly lower 1,000-grain weight as compared to that from the bare soil treatment. This was probably attributed to some compensation among yield components; grain number and grain weight. Irrespective of mulching, non-irrigated treatment caused significant reduction in spike number/m^2, spikelet number/spike, grain number/spike which consequently resulted in significantly lower wheat grain yield as compared to full irrigated treatment. Omission of irrigation during the period before booting stage (late irrigated treatment) reduced spikelets/spike which was consistent with the findings of Frank and Bauer (1987). However, the wheat crop recovered upon rewatering at booting stage and produced comparable grain number/spike, 1,000-grain weight and grain yield as compared to full irrigated treatment. On the contrary, omitting irrigations from booting stage until maturity (early irrigated treatment) caused a marked reduction in grain number/spike, 1,000-grain weight and grain yield in wheat. This was in agreement with the reports of Day and Inthalap (1970); Day and Thompson (1975); Sandhu and Horton (1977); Hochman (1982); Meechoui (1985); Youngsuk and Hawmdawk (1987). Furthermore, it was observed that non-irrigated and early irrigated treatments caused significant reduction in grain-bearing spikelet/spike in wheat as compared to late irrigated and full irrigated treatments (Appendix Table 17). This reflected a higher spikelet sterility caused by water stress