

Efficiency of Close Spacing and Light Interception in Promoting Productivity of Arabica Coffee in Ethiopia

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SUMMARY

The impact of high density planting (close spacing) on vegetative growth and productivity of Arabica coffee on light interception by individual trees has been studied to determine the optimum plant population for the various coffee berry disease (CBD) resistant cultivars grown in the different agro-ecologies in the southern and south western parts of Ethiopia. The experiment was carried out in two sets at Jima (mid-altitude), Tepi (low land), Gera and Wonago (highlands) research centers. Set I was conducted in split plot design with four replications, using ten cultivars from the three canopy classes (open, intermediate and compact coffee types) as main plot and five spacing treatments (2500 to 10,000 trees ha⁻¹) as sub plot factors. In set II, a widely adaptable cultivar (an intermediate type, 7454) was planted at seven spacings representing 4,000 to 10,000 trees ha⁻¹) in randomized complete block design replicated four times. After ten years of experimentation, it was observed that close spacing significantly and consistently encouraged the rate of death of productive primary branches, but depressed the growth of potential crop bearing primaries at all the trial sites. As a result, eight years mean crop yield of individual coffee trees decreased, while yield ha⁻¹ significantly increased with increasing population density. Increases in the proportion of dead primary branches and, thus, the decline in crop bearing surface and yield tree⁻¹ were directly associated with the increased level of mutual shading or with the reduction in light interception by individual trees in high-density plantings. It is, therefore, suggested that depending on the agro-ecological condition and canopy spacial arrangement of coffee varieties the biological optima lies between 4000 and 6000 trees ha⁻¹, while the economic optima assumes as high as 6,000 to 9,000 trees ha⁻¹.