

Dry-Spell Analysis for Studying the Sustainability of Rain-Fed Agriculture: Applied to the Arbaminch Area in Ethiopia

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Abstract. Several severe droughts (prolonged dry-spells) have occurred in Ethiopia in the past four decades, which have caused considerable damage to rain-fed agriculture. Consequently, severe famines occurred that have greatly affected the lives of several people and also hampered the country's socio-economic development. In this paper, it has been tried to show the practical application of dry-spell analysis on long records of daily rainfall data (more than 25 years) for justifying the failure of rain-fed agriculture in semi-arid and arid areas of the country. The case of the Arbaminch area is presented for two commonly grown crops (maize & cotton) at two sites – the Arbaminch State Farm and the Kola Shara Farmers' Farmland. Decisive dry-spell durations (t_D) for the two crops were estimated in an innovative way by applying the methods used in the determination of frequency of irrigation. The results show that rain-fed agriculture in the area is virtually impossible without supplementary irrigation. This is because, almost every year, dry-spell durations that cause damage to crop yield in the area occurs. This explains the failure of rain-fed agriculture in Ethiopia and hence crop failure, that may cause famine, occurs even in normal rainfall years.

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