

Université Catholique de Louvain
Faculté des sciences
Unité de géographie

Place Louis Pasteur 3, 1348 Louvain-la-Neuve, Belgium
Tél. 32 (0) 10 47 28 72
E-mail almeerkerk@hotmail.com

The spatial distribution and properties of rainfed orchards in semi-arid environments result from complex interactions between man and the physical and economical environment. This thesis investigates a number of these interactions in the context of the mechanisation of management practices since the 1950's. It is shown how the practice of clean sweeping (i.e. frequent shallow tillage) influences the orchard water balance and how the removal of traditional soil and water conservation structures affects the connectivity of overland flow to the river system. Although clean sweeping prevents transpiration and competition by weeds, it also constrains the root growth in the plough layer, so that the trees cannot access the water from small rain events. In addition, clean sweeping promotes accelerated soil erosion. It appears that the practice of clean sweeping limits the water availability in orchards on loamy soils with an annual rainfall in the order of 300 mm. It is demonstrated that the presence and properties of rainfed orchards are related to spatial patterns of soil characteristics and climate. The observed decline in conservation structures like terraces and check-dams leads to an increase in the connectivity of water and sediment to the river system. An alternative for these traditional techniques to retain the water and the soil is the application of cover crops. The advantage of cover crops is that they do not limit the field size. A drawback in dry areas is the competition for water and nutrients between the cover crop and the trees. Field evidence and water balance simulations suggest that cover crops are feasible in areas with an annual precipitation of 500 mm or more.

The author was born in Rotterdam, The Netherlands in 1980. He obtained a B.Sc and M.Sc degree at Wageningen University, The Netherlands, based on the study program "Soil, water, atmosphere", specialisation soil science and land evaluation. The work at Wageningen University included two theses, of which one was carried out in South Africa, as well as an internship in Senegal. One of the theses was published as: Meerkerk, A.L., Arens, S.M., van Lammeren, R.J.A., Stuiver, H.J., 2007. Sand transport dynamics after a foredune breach: A case study from Schoorl, The Netherlands. Geomorphology 86, 52-60. More information about the author is available on his personal website: <http://www.alataire.nl/>.



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ANDRÉ MEERKERK

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