Olea capensis in Kakamega forest does not show any evidence of natural regeneration under the parent trees. This study sought to determine the factors that may be responsible for the lack of natural regeneration under the adult parent crowns in the Kakamega forest, Kenya. The study was carried out between November, 1999 and August, 2000 which marked the end of the fruiting period when one would expect to find a lot of germinated seeds on the forest floor. Contrary to this expectation, there was no observed germination. It was, therefore, envisaged that chemical inhibition by the parent tree may be responsible for the lack of seed germination and establishment under the parent crowns. Three principal bioassay methods were used to test whether chemical interaction indeed may be a possible mechanism inhibiting the germination and establishment of seeds and seedlings in the immediate vicinity of Olea adults inside the forest. To distinguish allelopathic interactions from others such as seed unviability, bioassays were applied on experimentally germinated seeds in the nearby forest tree nursery where sprouting of buds and shoots was monitored and measured. Controls were watered with distilled water. Live-shoot bioassay significantly inhibited seed germination. Both shoot and root leachates significantly ($p \leq 0.05$) reduced shoot and root budding in young experimental seedlings in the forest tree nursery. Shoot leachates appear to be the most effective inhibitors of seed germination and establishment of Olea seeds and seedlings inside the Kakamega forest. Shoot leachates also significantly ($p \leq 0.05$) retarded the growth of Olea seedlings. This has practical implications for the regeneration of Olea in the Kakamega forest and explains the clumped distribution of Olea adults in the forest. Inhibitory substances appear to delay germination of seeds for periods long enough for predation to occur. The implication is, only seeds that are dispersed distances away from Olea adults will germinate and establish, and the dispersal pattern determines the eventual spatial distribution