

THE POTENTIAL FOR MECHANICAL HARVEST OF SISAL

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ABSTRACT. With current renewed interest in natural fibers, traditional suppliers of sisal such as those in Tanzania are looking to reestablish high production levels despite the shortage of field workers for laborious and hazardous harvest operations. Cutting force and energy determinations made with *Agave sisalana* leaves indicated that these parameters were well within the capabilities of workers even at a work rate twice that of current levels. Measurements of leaf bending resistance, friction coefficients, and mass distribution were made to assist designers of equipment to handle sisal leaves. Physical simulations of cutting operations with worker aids aimed at obviating the stooping currently required of harvest workers, indicated that only tools powered by some external energy source could match or exceed the current traditional work rate of one leaf per 2.9 s. Among the design concepts formulated for in-field leaf handling, collection and transport devices, there was an indication that an inverted umbrella type leaf catcher may have economic potential. Because the cutting operation is complex and selective, it was concluded that the most immediate potential for sisal harvest mechanization would involve manually operated cutting mechanisms using worker aids, combined with mechanized infield collection, handling and transport of leaves.

Keywords. Sisal, *Agave sisalana*, Harvest, Mechanization, Cutting, Physical properties.