

Title	:	Evaluation of windbreaks for enhancing water use efficiency, crop productivity and climate change resilience in farmlands in semiarid regions of Tamil Nadu
Principal Investigator	:	Dr. C. Buvaneshwaran
Co-Investigator	:	
Duration	:	4 Years (2016 to 2020)
Objectives	:	<ol style="list-style-type: none"> 1. To evaluate efficacy of superior clones in windbreak agroforestry in enhancing water use efficiency in agro-ecosystem of semiarid regions in Tamil Nadu 2. To study the effect of windbreaks on productivity of agriculture crops. 3. To develop and demonstrate suitable windbreak agroforestry systems for enhancing water and crop productivity in semiarid regions.
Funding Agency	:	ICFRE
Summary/Achievements	:	<p>The monsoon wind and occasional wind storm cause not only damages to crops but also associated enhanced soil moisture loss and in extreme event soil erosion as well in agriculture. Further consequence is that loss of organic matter rich top soil along loss of major nutrients - Nitrogen, Phosphorus and Potassium – to the tune of 50%. Losing of top soil through erosion, therefore, will cause yields to decline over time, which lead to posing threat to sustainability in the agriculture system. Windbreaks are one of the viable strategy for addressing the issues related to wind erosion and soil moisture loss through evapo-transpiration processes. In this regard, Institute of Forest Genetics and Tree Breeding (IFGTB) Coimbatore has successfully released five productive tree varieties (clones) of <i>Casuarina junghuhniana</i> suitable for windbreak Agroforestry system. These Windbreak clones of IFGTB show high level of branch persistence with 40 to 50 thick and horizontal branches within 3 m height from the base of the tree. The other superiority of these clones are: i) greater branch thickness, ii) wider branch angle along with iii) greater height growth rate and iv) faster diametrical growth rate of main stem. The efficacy of these windbreak clones in micro-climate moderation, enhancing of water use efficiency, agriculture crop productivity and soil moisture retention in the farm fields was assessed in the present study.</p> <p>The results revealed that there is a significant effect of windbreak on wind speed reduction and soil moisture retention inside the field with windbreaks, when compared to the adjoining open field. The percentage reduction in wind speed inside the windbreaks ranged from 25 to 65% when compared to the wind speed in the adjoining open field. Further, the cumulative soil moisture loss in five consecutive days ranged from 9.82% to 10.09% inside the windbreaks and the soil moisture loss in five consecutive</p>

	<p>days was from 25.05% to 26.86% in the adjoining open area. Thus, windbreaks was more effective in reducing water loss through evapotranspiration. In short, Windbreaks can be one of the way in achieving our national goal of “MORE CROP PER DROP”. In the present project, it was recorded that besides preventing the crop from lodging due to heavy wind, the windbreaks enhanced the yield of the red gram as well. The yield of red gram was 600 kg per acre inside the windbreaks but the yield of red gram was only 400 kg per acre in the open field outside the windbreaks during 2018. Similarly, the yield increase was recorded in the second consecutive year (during 2019) also under Windbreak Agroforestry system, when compared to the yield of red gram in the adjoining open field without windbreaks. By considering the above facts. Windbreak Agroforestry system can be promoted to make the agro-ecosystems as climate change resilient system through i) enhanced productivity, ii) reduced evapotranspiration and in turn increased water use efficiency of the agro-ecosystemas, iii) reduced crop damage particularly in plantain cultivation and iv) increasing carbon sequestration in biomass and in soil.</p>
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