

Drought (water) stress effect in rice



Fig 1. A. Seedling drought (http://www.knowledgebank.irri.org/ricebreedingcourse/Breeding_for_salt_tolerance.htm)



Fig 2. Severe drought effect



Fig 3. Dried panicles and leaves



Fig 4. Rice Desiccation in Taita Taveta

Importance

- Drought is a period of low moisture last from as low as 15 days to years causing extreme dryness
- Drought is a major global challenge
- Rice requires more water than any other crop
- Drought could appear at seedling, vegetative, reproductive and terminal drought based on plant phenological stage causing varying levels of damage
- Drought is severe under upland, followed by lowland and sometimes irrigated fields.
- With climate change areas that had reliable rains are now faced with erratic rainfall patterns
- Moisture stress causes changes in the physiological, morphological, biochemical, and molecular traits in plants

Symptoms

Drought causes;

- Cracking of soil especially black cotton soils indicate water stress disrupting root growth
- Plant wilting, the leaves look flaccid and in severe cases roll up like onion leaves
- Spikelet's sterility and low 1000 grain weight
- Leaf turning from green to pale green and finally scorching in case of severe stress
- Reduced leaf size & stunted growth due to reduced internode growth



Fig 5. C. Drought stress and cracked soil (Wasilwa LA-KALRO)

- Lodging due to loss of turgidity
- Plants tend to mature early to complete life cycle
- Reduced spikelet's per panicle and panicle size

Predisposing factors

- Reduced rainfall or irrigation
- Sandy soils are more prone to water stress due to high percolation and evapotranspiration
- Shallow rooting due to hardpans
- Low humidity coupled with high & low temperatures and strong sunlight
- Salinity
- Air circulation move water from place to place
- Weather pattern such El Nino & La Nina
- Human activities like deforestation
- Global warming

Management Strategies

- Irrigation through either sprinkler, drips or farrow
- Rain water harvesting & recycling
- Avoiding over cropping
- Priming of seed
- Use of tolerant rice varieties such a deeper variety, 1-DRO1
- Mulching
- Use of green manure such thionia
- Building of water reservoirs
- Re-afforestation
- Soil moisture conservation techniques
- Control of migrations
- Water rationing
- Reduce water pollution

Economic loss due to drought

- Drought depending on the crop stage reduces grain and biomass yields
- It can cause even up to 100% yield loss depending on the severity
- Loss of income
- Reduce hydropower supply
- More bush fires
- Low businesses in water fronts due to reduced volumes
- High food prices
- Desertification and overgrazing
- Increased human-wildlife conflicts
- Population migration, anxiety and stress



Fig 7. Useful sites & references:
A.B.C(www.knowledgebank.irri.org/rice.htm)
www.lsuagcenter.com
(<http://www.kalro.org/riceknowledgebank/countryhome.aspx>)



Fig 8. Useful sites & references:
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Scorched plants

Contributors: Wandera F (Fredrick.Wandera@kalro.org); Wasike, V; Otipa, M; Kimani, J; Kega, V; Ochieng, V; Kirigua, V., Wasilwa L., Kundu C. A.; Esilaba A.O., Mutiga S; KBeCA ILRI); Mugambi, C; Ngari, B; Zhou, B (IRRI); Mitchell T. (OSU); Wang, G. L (OSU); Were, V (TSL); Ouedraogo, I (INERA); Rotich, F (UoEm); Correll, J. C. (UARK) and Talbot, N. J. (TSL). *E-Guide for Rice Production in East Africa (2019)*