AGRI MAGAZINE
(International E-Magazine for Agricultural Articles)
Volume: 01, Issue: 05 (December, 2024)
Available online at http://www.agrimagazine.in
©Agri Magazine, ISSN: 3048-8656

Agronomic Practices for Moisture Conservation in Arid Legumes

(Savankumar P Patel[1], *Munira S Mandviwala[2], Maulik R Sutariya[1] and Yuvraj H Kamaliya[3])

[1]Agriculture Officer, Government of Gujarat, Gujarat, India
[2]Department of Agronomy, Navsari Agricultural University, Navsari, Gujarat, India
[3]Gram Sevak, Government of Gujarat, Gujarat, India
*Corresponding Author's email: munira0412@gmail.com

Legumes, a vital group of plants belonging to the family *Leguminosae*, play a crucial role in providing nutritious food, feed, and fodder while conserving natural resources and maintaining ecological balance. With approximately 800 genera and 20,000 species worldwide, legumes such as beans, peas, chickpeas, and lentils are rich in proteins, minerals, and fiber, benefiting both humans and animals. In addition to their nutritional value, legumes contribute to sustainable agricultural practices by enhancing soil fertility through nitrogen fixation. India is the largest producer of legumes along with having the highest area under legumes in the world. Gra is the mots produced legume in India followed by soybean and pigeon pea.

Nutritional and Health Benefits of Legumes

Legumes are a powerhouse of nutrients that provide multiple health benefits:

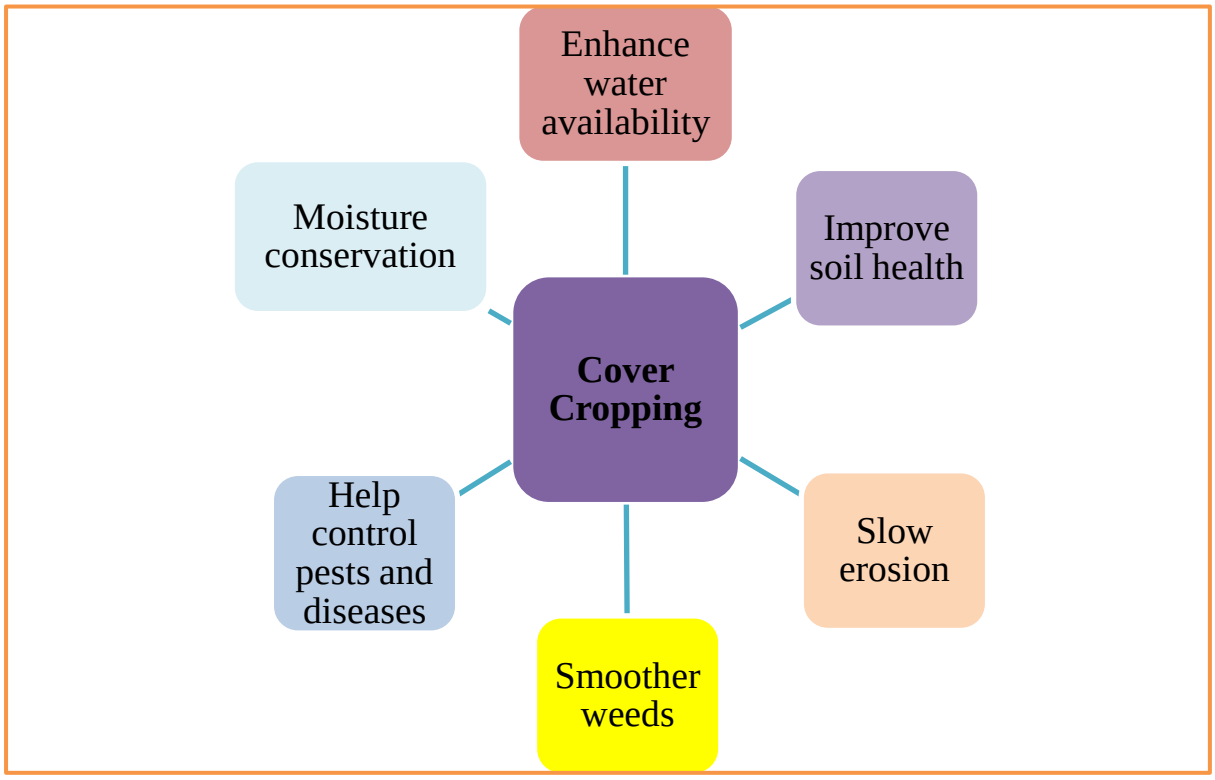
- Heart health: Reducing cholesterol levels.
- Immunity boost: Enhancing body defenses.
- Vision care: Maintaining eye health.
- Diabetes management: Regulating blood sugar levels.
- Cancer prevention: Reducing cancer risk.
- Bone health: Improving calcium absorption.
- Weight management: Supporting weight loss.

Agronomic Practices For Moisture Conservation

Moisture conservation is a critical aspect of sustainable agriculture, particularly in arid and semi-arid regions where water availability is limited. Key practices include:

1. **MULCHING:** Materials like straw, wood chips, or plastic are applied to the soil surface to reduce evaporation, retain moisture, and improve soil health. Organic mulches decompose over time, enhancing water retention. It reduces water loss by 15-30%, controls soil erosion, and suppresses weed growth. Sanbagavalli *et al.* (2017**)** reported that use of bajra straw mulch @5t/ha recorded an increased soybean yield.
2. **CONSERVATION TILLAGE PRACTICES:** Techniques like zero tillage and ridge tillage minimize soil disturbance, maintaining plant residues on the surface. These methods improve soil structure, reduce evaporation, and conserve water. Conventional tillage with residue incorporation increased seed and stover yield in greengram (Meena *et al.* (2015)).
3. **ORGANIC MANURES:** The use of farmyard manure, compost, and green manure enriches the soil with nutrients and improves its water-holding capacity. Lyngdoh *et al.* (2017) reported that combined use of Vermicompost + Fish Amino Acid + Panchagavya + Biofertilizers increased growth and yield of cowpea. Enriched compost (5 t) + *Rhizobium* + PSB increased yield and harvest index in soybean (Yadav *et al.* (2019)).

4. **CROP ROTATION AND COVER CROPPING:** Rotating crops and using cover crops prevent soil degradation, improve fertility, and reduce water loss. Cover crops act as a protective layer, reducing runoff and evaporation. Yield of summer green gram increased when included in Maize-Chickpea-Greengram rotation. Meena *et al*. (2015)



5. **LAND CONFIGURATION:** Methods like broad bed and furrow (BBF), ridges, and flatbeds optimize water use efficiency, reduce lodging, and save irrigation time and water by 20-30%. Dhale *et al.* (2021) reported that growth and yield of soybean increased under broad bed furrow. Moreover, yield and water use efficiency increased when chickpea was planted on raised beds (Pramanik *et al.* (2009)).
6. **WEED MANAGEMENT:** Weed management is the application of certain principles and suitable methods that will improve the vigor and uniform stand of the crop, at the same time ignore or discourage the invasion and growth of weeds. Proper weed control minimizes competition for water and nutrients, increasing crop yield by 25-50%.
7. **ANTI-TRANSPIRANTS: Anti-transpirants** are substances or chemicals applied on plant foliage to control rate of transpiration. Nearly about 99 per cent of the water absorbed by the plant is lost through transpiration and only 1 per cent is used in metabolic activities of plant.

There are four types of Anti transpirant:

- Stomatal Closing type, ex. – PMA, Atrazine
- Film Forming type, ex. – Oil, Wax, silicon
- Leaf Reflecting type, ex. –Kaolin, Celite
- Growth Retardants, ex. – Cycocel (CCC)

Sanbagavalli *et al.* (2017) reported that 1% Potassium nitrate increased growth and yield of soybean.

8. **INTERCROPPING:** Growing multiple crops simultaneously optimizes resource use, increases income, and acts as insurance against crop failure. Singh *et al.* (2008) reported that intercropping of maize with French bean in 2:2 proportion resulted in higher equivalent yield, net profit as well as post-harvest nutrient status of soil.

Conclusion

Agronomic practices for moisture conservation significantly enhance the yield of arid legumes by 10-15%. Techniques like mulching, conservation tillage, organic amendments, and intercropping are effective in reducing water loss, improving water use efficiency, and sustaining agricultural productivity in challenging environments.

References

1. Dhale, S. Y., Gore, A. K., Asewar, B. V., and Javle, S. A. (2021). Effect of tillage and land configuration practices on growth and yield of rainfed soybean (Glycine max (L.) Merill). *Journal of Pharmacognosy and Phytochemistry*, **10**(1), 1245-1248.
2. Lyngdoh, C., Bahadur, V., David, A. A., Prasad, V. M., and Jamir, T. (2017). Effect of organic manures, organic supplements and biofertilizers on growth and yield of cowpea [Vigna unguiculata (L.) Walp]. *Int. J. Curr. Microbiol. App. Sci*, **6**(8), 1029-1036.
3. Meena, J. R., Behera, U. K., Chakraborty, D., and Sharma, A. R. (2015). Tillage and residue management effect on soil properties, crop performance and energy relations in greengram (Vigna radiata L.) under maize-based cropping systems. *International Soil and Water Conservation Research*, **3**(4), 261-272.
4. Pramanik, S. C., Singh, N. B., and Singh, K. K. (2009). Yield, economics and water use efficiency of chickpea (Cicer arietinum) under various irrigation regimes on raised bed planting system. *Indian Journal of Agronomy*, **54**(3), 315-318.
5. Sanbagavalli, S., Vaiyapuri, K., and Marimuthu, S. (2017). Impact of mulching and anti-transpirants on growth and yield of soybean (Glycine max L. Merril). *Advances in Environmental Biology*, **11**(1), 84-89.
6. Singh, U., Saad, A. A., and Singh, S. R. (2008). Production potential, biological feasibility and economic viability of maize (Zea mays)-based intercropping systems under rainfed conditions of Kashmir valley. *Indian Journal of Agricultural Sciences*, ***78***(12), 1023.
7. Yadav, K., Meena, S. C., Gajanand, J., Ameta Rakesh Khatik, K. D., and Dinesh Chandra, J. (2019). Productivity of Soybean (Glycine max L. Merril) as Influenced by Combined Use of Enriched Compost and Biofertilizers. *International Journal of Chemical Studies*, ***7***, 1324-1326.