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Promising Mulches in Pomegranate

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Introduction

Pomegranate is an important fruit crop of arid and semiarid regions of India. Maharashtra, Karnataka and Gujarat are the leading producers of pomegranate in India. In Maharashtra, pomegranate is predominantly cultivated in Solapur, Ahmednagar, Pune, Nasik, Sangli, Satara, Beed, Latur, Dhule, Nandurbar, Yevatmal, Wardha, Wasim and Osmanabad districts. As water is a scarce resource in most of the pomegranate growing regions of India, it should be judiciously used for sustainable production. Mulching is an important agro-technique that helps to help to overcome the water shortage during summer months.

Mulching is the practice of covering the soil surface with any organic or inorganic material for reducing the evaporation, conserving the soil moisture and smothering the weeds. Mulches are protective layer of organic material that is spread upto7-10 cm depth like crop residues) or inorganic material like 100 micron thick-polyethylene Pervious/Weed mat placed on top of exposed soil below the plants. Mulches are useful in regulating microclimate conditions

Types of mulches

Mulches are classified into 2 type's viz., Organic mulches or inorganic mulch.

S.No.	Particulars	Organic mulch	Inorganic mulch
1	Source material	Biotic in nature	Abiotic in nature
2	Decomposition	Easily decompose and release humic acid, nutrients, *etc* & increase organic matter content of soil. Are environmental friendly.	Do not decompose easily, hence may pollute the environment if not properly disposed.
3	Example	Straw, grass clippings, corn cobs, bark chips, leaves, wood ashes, sawdust, wheat straw, safflower waste, paddy straw, sugarcane baggasse	Pebbles, rocks, gravels, rubber and plastic sheets

Advantages: Mulches are advantageous in several ways and help in

- Conservation of soil moisture through reduction of evaporation
- Smothering of weeds
- Controlling soil erosion
- Improving beneficial soil micro flora

Locally available crop residue / organic waste material can be used as organic mulch without extra expenditure

How to Apply Mulch

In general mulch should be applied during crop regulation periods and only after rainy season. Though organic mulch can be applied in rainy season also but inorganic mulch should be removed during rainy season.

Organic mulch: Sugarcane bagasse is the fibrous dry pulpy residue left after the extraction of juice and is a by-product of sugar industry. It serves as an excellent mulch material for pomegranate.

- Plant the pomegranate saplings; install drip irrigation system along the beds
- Select a circular area with 40-60cm diameter at base of pomegranate
- Remove all the weeds at the base of plants
- Apply sugarcane bagasse@3-4 kg/plant
- Spread uniformly to 3-4" thick layer to block the sunlight

Inorganic mulch:

- Select 1.5x1.0 m area at the base of plants
- Remove all the weeds from the rectangular area
- Make raised beds of 1.5x1.0 m size at the base of plants
- Select pervious / weed mat of 1.5x1.0m (lxb) size,
- Place the pervious / weed mat on raised beds and fix the borders with soil
- Should be removed in rainy season

Techniques for laying out of organic mulch

Techniques for laying out of inorganic mulch

Do's and Don'ts for Applying Mulch-

Do's	Don'ts
Apply sugarcane baggasse mulch in a 6-10 cm layer around each tree after new leaf initiation period starts. Surround the trees with around40-60 cm of circle of sugarcane baggasse mulch or as far out as the lateral line.	Don't mound the sugarcane baggasse mulch against tree trunks. Keep sugarcane bagasse mulch 2.5-5.0 cm away from the crown of a plant. Mounding limits air circulation and creates excessive moisture, increasing the risk of disease and encouraging insect pests and rodents.

Critical plant stages for irrigation:

There are 4 critical stages for irrigation of pomegranate and the water requirement varies during different stages. The water requirement at different stages is given below.

Critical Stages	No. of days	Water requirement (litres)		
		Sugarcane baggasse	Pervious/weed mat	Without mulch
New Leaf Initiation	22-25	154-175	230-250	233-330
FruitDevelopment	70-80	1400-1600	1600-1800	1880-2340
Fruit Maturity	60-70	1620-1890	1750-1950	2151-2546
Fruit Harvesting	45-60	1800-2400	2000-3000	2620-3450
Total		4974-6065	5580-7000	6884-8667

Water use and water use efficiency

Mulches reduced the rate of water loss through evaporation from soil surface. Organic mulch uses less water as compared to inorganic mulches. So, the soil water plant relationship isbetter in low irrigation regime than high irrigation regime that might help produce higher yield and thereby higher water use efficiency.

Effect of organic and inorganic mulches on water use efficiency

Mulches	Water requirement in (litres)	Number of fruits / plant	Average fruit weight(g)	Yield (kg/ plant)	Water conserved (%)	Water Use efficiency (kgm^{-3})
Sugarcane baggasse	5519	65	290.50	18.88	30-35	2.20
Pervious/weed mad	6290	63	285.65	17.99	25-30	2.46
without mulch	7682	45	265.45	11.94	-	1.55

Economic benefits

The use of mulch has Benefit: Cost ratio of 3.14 to 3.17

Economics of pomegranate under mulching

Promising Mulches	Cost of cultivation/ha (Rs. In lakhs)	Gross production ($t.ha^{-1}$)	Total income ($Lakh.ha^{-1}$)	Net income ($Lakhha^{-1}$)	B:C Ratio
Sugarcane baggasse	2.87	13.97	9.04	6.16	3.14
Pervious orweed mad	3.61	13.31	11.46	7.85	3.17
Without mulch					

Advantage and disadvantages of organic and inorganic mulches

Organic mulch		Inorganic mulch	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
• supply organic matter to the soil improving soil profile • Improve both the physical and chemical properties	• Attract termites and bugs • Needs to be re-applied every years	• Do not attract pests • Conserve soil and moisture • Retain moisture in root areas • Control weeds	• Don't decompose over time • Zero nutritional value • Sun damaged and starts to look worn over time. • More expensive • Does not allow the soil to respire.

of soils • Enhances the water holding capacity, nutrient availability and aeration of the soil • Protects soil from drying winds, heat and heavy rains and soil erosion • Reduces losses to soil borne diseases • Reduced soil temperatures under organic mulches favor root growth in the upper soil layer where there is more air and nutrients		growth. • Avoid soil erosion Do not decompose, which can be beneficial in certain situations. • Enhanced crop growth by reduced competition for light, available water and nutrients.	• organisms

Mulching is beneficial to the farmers for higher production and quality of fruits. Mulching techniques ensure increased crop yield, high water use efficiency, reduced water and energy consumption and minimal weed problems. It is recommendedto use sugarcane baggasse or pervious mulches for better water use efficiency and maximum returns in pomegranate.

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