**Kharif Fodders**

1. **Sorghum** *(Sorghum bicolor L.)*

**Botany and importance**

It belongs to family Gramineae and locally known as jower or chali. It is very important summer fodder crop and provides palatable green fodder over a long period. It contains 12% protein, 70% carbohydrates and minerals. It is well liked by all kinds of animals. Its grains are used as poultry feed.

**Climate**

It possesses a great deal of adaptability to various types of climate and soil conditions. So, it can be cultivated in both rainfed and irrigated areas.

**Varieties**

JS-2002, Hegari, JS-263, Chakwal jower, Jower-2011

**Soil and seedbed preparation**

It can be cultivated in light saline soils but heavy loam soils are more suitable with good drainage. Seedbed can be prepared with one ploughing with a mouldboard plough followed by two ploughings with a cultivar along with planking.

**Sowing time**

* For fodder crop (March-August)
* For grain crop (July)

**Seed rate and sowing method**

* For fodder crop (32-35 kg/acre). Traditionally, sowing is done with broadcast but cultivation on 1 feet apart lines with pora method gives better production.
* For grain crop (6-8 kg/acre). Cultivation is done on lines with 11/2-2 feet distance and after thinning, distance should be 6-8 inches.

**Fertilizer application**

On- month before sowing, spread 3-4 trolley FYM in field and mix with ploughing. After that use fertilizers as per need.

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| **Crop** | **N** | **P** | **K** | **At sowing time** | **With 2nd irrigation** |
| Fodder crop | 32 | 23 | 12.5 | 1 bag DAP+1/2 bag urea+1/2 bag SOP | 1/2 bag urea |
| Grain crop | 20 | 23 | 25 | 1 bag DAP+1 bag SOP | 1/2 bag urea |

**Irrigation**

About 3-4 irrigations are given to this crop. 1st irrigation is applied after three weeks of sowing. Remaining irrigations are applied as per need.

**Weeds**

Itsit and tandla are main weeds of sorghum. Use recommended herbicides to control weeds.

**Diseases**

Red leaf spot is most serious disease which can be controlled by seed treatment with fungicide.

**Insects**

Shoot fly and stem borers, inflict serious damage to crop. Use recommended insecticide to control insects.

**Time of harvesting and production**

Best time for harvesting fodder is at the 50% heading stage.

1. **Sadabahar** *(Sorghum bicolor (L.) Moench × Sorghum sudanense)*

**Botany and importance**

It belongs to family Gramineae (Poaccae). It is prepared as a crossing result between sorghum and Sudan grass. It has become a popular summer fodder. Sadabahar is multi-harvest and nutritious palatable fodder. It gives repeated harvests and is rightly called a “berseem of summer”. It has 1250 monds/acre potential yield.

**Climate**

It can be grown in hot and dry climate conditions as it has high ability to tolerate such conditions.

**Varieties**

Sweet Sadabahar (certified variety of FRI Sargodha).

**Soil and seedbed preparation**

Heavy loam soils are more suitable for its cultivation. Seedbed can be prepared with one ploughing with a furrow-turning plough followed by three or four light ploughings with a cultivar along with planking.

**Sowing time**

Its cultivation should be completed from 15 February- 15 March to get maximum cuttings.

**Seed rate**

Use 8-10 kg clean and healthy seed for one acre.

**Sowing method**

Cultivation is done on 11/2 feet apart lines with drill method gives better production. Too deep sowing gives poor germination. Do not cultivate via broadcast method.

**Fertilizer application**

One-month before sowing, spread 3-4 trolley FYM in field and mix with ploughing. After that use fertilizers as per need.

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| **Crop** | **At sowing time** | **With every cutting** |
| Fodder crop | 2 bag nitrophos +1/2 bag SOP | ½-1 bag urea |
| Grain crop | 2 bag nitrophos +1 bag SOP | ½-1 bag urea |

**Irrigation**

About 8-10 irrigations are required to get a good crop. 1st irrigation is applied after three weeks of sowing. Subsequent irrigations are applied if and when required.

**Insects**

Shoot fly and stem borers. Use recommended insecticide to control insects.

**Time of harvesting and production**

The 1st harvesting can be done 60 days after sowing. Harvesting should be done on 50% heading stage or on 5-6 feet crop height. Delay harvesting can lead to poor quality and production.

1. **Pearl millet** *(Pennisetum americanum).*

 **Botany and importance**

It belongs to family Gramineae, locally known as bajra. It is dual purpose crop grown throughout country both for grain and fodder. It has good tolerance for drought. It has minimal input requirements and gives a reasonable return of fodder on medium as well as light soils. Mixed cropping of bajra with maize and sorghum is very popular.

**Climate**

It is a warm-weather crop and is preferred in areas where water scarcity is often experienced. It is extensively sown in the dry and arid regions of Pakistan.

**Varieties**

* MB-87 (multi-cut variety of FRI Sargodha).
* Sargodha bajra (variety of FRI Sargodha).

**Soil and seedbed preparation**

Except saline waterlogged soils, it can be cultivated in every type of soil. It does best on light sandy loam soils with good water drainage. Soil levelling is necessary for better crop production. The land is given two or three ploughings, each followed by planking.

**Sowing time**

Fodder crop should be planted in March-May and grain crop is planted in July.

**Seed rate**

* Use 5-6 kg/acre for fodder crop.
* Use 2-3 kg/acre for grain crop.
* Always use clean and healthy seed.

**Sowing method**

The broadcast method is common for fodder crop but sowing in lines 1 feet apart with drill gives better results. Sowing should be done in watter condition in the morning or before sunset.

**Fertilizer application**

One-month before sowing, spread 3-4 trolley FYM in field and mix with ploughing. After that use fertilizers as per need.

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| **Crop** | **At sowing time** | **At 1st irrigation** |
| Multi-cut | 1 bag DAP +1/2 bag SOP/MOP | 1 bag urea |
| Single-cut | 1 bag DAP +1/2 bag SOP/MOP | 1 bag urea |

**Irrigation**

About 2-3 irrigations are required to get a good crop. 1st irrigation is applied after three weeks after sowing. Subsequent irrigations are applied if and when required.

**Weeds**

Itsit and tandla are the serious weeds. Use recommended herbicide to control the weeds.

**Insects**

Fodder crops usually remain free of insect pests.

**Diseases**

Sometime under humid conditions grain crops are slightly affected by leaf spot, green ear or grain smut. Consult with agriculture extension worker for better control.

**Time of harvesting and production**

 Harvesting can be done 60 days after sowing. Harvesting should be done on 50% heading stage. Delay harvesting can lead to poor quality and production. Forage yield range 200-250 monds/acre in rainfed areas and 500-600 monds/acre in irrigated areas. About 10-15 monds/acre yield can be obtained from grain crop.

1. **Maize** *(Zea mays L.)*

**Botany and importance**

It belongs to family Gramineae, locally known as Makai or makka. Maize is most important and delicious fodder of kharif season. Traditionally, it is called “Ghaacha”. This crop is ready in about 55-65 days for fodder. Usually it is cultivated near the urban cities. maize has more carbohydrate contents so is used animal as well as poultry feed. Maize fodder can also be used to make silage for animals.

**Climate**

Maize is adaptable to widely varying climatic and soil conditions. However, it performs poorly under areas with high rainfall.

**Varieties**

* Sargodha-2002 (variety of FRI Sargodha).
* Do not use any hybrid variety for fodder.

**Soil and seedbed preparation**

Heavy loam soils with good water drainage are more suitable for its cultivation. Seedbed can be prepared with three or four ploughings with a cultivar along with planking.

**Sowing time**

Fodder crop should be planted from 15 February-September and grain crop is planted in July.

**Seed rate**

* Use 40-50 kg/acre for fodder crop.
* Use 10-12 kg/acre for grain crop.

**Sowing method**

The broadcast method is common for fodder crop but sowing in lines 1 feet apart with drill gives better results. For seed crop lines distance should be 2-21/2 feet apart.

**Fertilizer application**

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| **Crop** | **At sowing time** | **At 2-3 feet crop height** |
| Maize | 1 bag DAP +1/2 bag SOP | 1 bag urea |

**Irrigation**

About 3-4 irrigations are required to get a good crop depending upon the amount of rainfall. 1st irrigation is applied after three weeks of sowing. In case of heavy rainfall, proper water drainage is done.

**Weeds**

Itsit and tandla are the serious weeds. Use recommended herbicide to control the weeds.

**Diseases**

Stalk rot and leaf blight are serious diseases of maize. Seed treatment with proper fungicide is helpful to control such diseases.

**Insects**

Shoot fly and stem borers. Use recommended insecticide to control insects.

**Time of harvesting and production**

Harvesting should be done on 50% heading stage. It should be harvested within 55-65 days. Delay harvesting can lead to poor quality and production. A good variety can give 600 mods/acre fodder yield.

1. **Cluster bean (Guar) (***Syamopsis tetragonoloba* Taub)

**Botany and importance**

It belongs to Leguminosae family, locally known as Guar. It is highly important Leguminosae crop of the kharif season. It is grown in our country mainly as a green fodder, but also for use as grain, green manure and a vegetable. It is known for its drought resistance and its soil-renovating qualities. It is also used as animal feed. By mixing guar with non-leguminous crops gives fodder with high nutritious value.

**Climate**

Guar performs better under warm and dry weather conditions. It can tolerate water scarcity for long time.

**Varieties**

BR-99, BR-90, BR-2017

**Soil and seedbed preparation**

Well drained, medium to light soils are best for cultivation. One to two ploughings followed by one planking are sufficient to prepare the seed bed.

**Sowing time**

* Fodder crop should be planted from 15 April-July
* Grain crop is planted in July.
* For green manuring, it is cultivated in May.

**Seed rate**

* Use 20-25 kg/acre for fodder crop.
* Use 12-15 kg/acre for grain crop.

**Sowing method**

The broadcast method is common for fodder crop but sowing in lines 1 feet apart with drill gives better results.

**Fertilizer application**

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| **Crop** | **At sowing time** |
| Guar | 1 bag DAP/acre |

**Irrigation**

About 2-33 irrigations are sufficient for fodder crop depending upon the main crop with which it has been sown (mixed).

**Diseases**

Wilt is common disease of guar. Seed treatment with proper fungicide is helpful to control it.

**Insects**

Jassid and white fly are insect of this crop. Use recommended insecticide to control insects.

**Time of harvesting and production**

Fodder crop is ready in 11/2-2 months; however, grain crop is ready in November. In irrigated areas, fodder production is about 350-500 monds/acre and in rainfed areas, about 150 monds/acre.

1. **Cowpea (Rawan) (***Vigna unguiculata*(L.) Walf.)

**Botany and importance**

It belongs to family Leguminosae, locally known as Rawan. It is most important fodder of kharif season. Cowpea makes an extremely important, nutritious and balanced fodder when mixed with non-leguminous crops. It can tolerate shade to a certain extent, and for this reason it is also grown in orchards. Nodule formation is done in its roots which helps in nitrogen fixation in soil imported for atmosphere leading to increase in soil fertility.

**Climate**

Cowpea is tropical plant, and thrives under warm and humid conditions.

**Varieties**

* Rawan-2003

**Soil and seedbed preparation**

Heavy loam soils with good water drainage are more suitable for its cultivation. Seedbed can be prepared with two or three ploughings with a cultivar along with planking.

**Sowing time**

This crop should be planted from March-July.

**Seed rate**

* Use 12 kg/acre for fodder crop.
* Use 8 kg/acre for grain crop.

**Sowing method**

The broadcast method is common for fodder crop but sowing in lines 2 feet apart with drill or kera gives better results. For seed crop lines distance should be 2-21/2 feet apart.

**Fertilizer application**

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| **Crop** | **At sowing time** |
| Cowpea  | 1 bag DAP |

**Irrigation**

1st irrigation is applied after three weeks of sowing. Subsequent irrigations are applied if and when required.

**Diseases**

Anthracnose is serious fungal diseases of cowpea. Seed treatment with proper fungicide is helpful to control such diseases.

**Insects**

Jassid, white fly and army worm are insect pests of cowpea. Use recommended insecticide to control insects.

**Time of harvesting and production**

This fodder crop is ready within two months of sowing. The best time for the cutting is the time of pod formation, when the fodder is full of nutrients. Fodder crop normally yields about 300-400 monds/acre and grain crop yields about 10 monds/acre.

1. **Mott Grass**

**Botany and importance**

It is perennial, digestible, notorious and mufti-cut kharif fodder. It is cultivated in fodder shortage period months to meet the fodder requirement of animals. This crop has about 7-8% protein.

**Climate**

Mott grass grows best in under warm conditions. It has ability to adopt winter season.

**Soil and seedbed preparation**

Heavy loam soils with good water drainage are more suitable for its cultivation. Seedbed can be prepared with two or three ploughings with a cultivar along with planking.

**Sowing time**

The best season for this crop is from 15 February to end March through cuttings. But it can also be sown in August and September months through roots.

**Seed rate**

* In cutting method, it is cut in such a way that each cutting will has two buds. 11000 cuttings are planted vertically two feet apart in such a way that one bud should be in soil, other above the soil.
* Roots planting method gives better production.

**Sowing method**

The broadcast method is common for fodder crop but sowing in lines 2 feet apart with drill or kera gives better results. For seed crop lines distance should be 2-21/2 feet apart.

**Seed availability**

Seed is available at NARC Islamabad, FRI, Sargodha and AARI Faisalabad.

**Fertilizer application**

Use 3-5 trolley FYM at sowing time.

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| **Crop** | **At sowing time** | **With every cutting** |
| Mott grass | 2 bag Nitrophos +1 bag SOP/MOP | 1 bag urea |

**Irrigation**

1st irrigation is applied immediately after sowing. Subsequent irrigations are applied if and when required.

**Time of harvesting and production**

First cutting is ready in 3-4 months after sowing when plants height is 3-4 feet. Second cutting is done after 11/2-2 months after first cutting. This crop normally yields about 1200-1500 monds/acre.

1. **Rhodes Grass (***Chloris gayana* Kunth.)

**Botany and importance**

It belongs to family Gramineae. Rhodes grass is very useful, multi-cut and fast-growing summer forage. Once sown it can provide forage for 7-8 years. It is very useful in rainfed areas to solve soil erosion problems. Due to its multi-cut nature, it can also be cultivated in pastures and forests. Rhodes grass is very suitable for hay making. It is cultivated in all over the world both the tropical and temperate zones.

**Climate**

It thrives in a warm and humid climate, and can be planted throughout Pakistan except in the colder areas.

**Soil and seedbed preparation**

Heavy loam soils with good water drainage are more suitable for its cultivation. Seedbed can be prepared with three or four ploughings with a cultivar along with planking.

**Sowing time**

* **For irrigated areas** (sowing is done in start of March through seed)
* **For rainfed areas** (sowing is done in June or July through seed)
* **For cuttings** (cultivation is done in mid-February-mid-March)
* **For roots** (cultivation is done in July and August)

**Seed rate**

* Use 5-6 kg seed per acre
* Use 11000-12000 cuttings per acre

**Sowing method**

The broadcast method is used for seeds crop but sowing in lines one feet apart through drill gives better production. For cutting cultivation, bend the cuttings on one side making 45-degree angle with soil. Every cutting should have two buds; one should be above the soil other below the soil. As cultivation is done in dry soil, so irrigate the field immediately after sowing. Distance between lines and cuttings should be 2 feet.

**Fertilizer application**

One-month before sowing, spread 3-4 trolley FYM in field and mix with ploughing. After that use fertilizers as per need.

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| **Crop** | **At sowing time** | **After each cutting** |
| Rhodes grass | 1 bag DAP +1/2 bag urea | 1 bag urea |

**Irrigation**

Apply irrigation weekly until crop is fully established. After that apply irrigation after 2-3 weeks or as required.

**Time of harvesting and production**

1st cutting is done almost after three months of sowing. However, remaining cuttings are ready in 35-40 days on re-flowering. Almost 6-7 cuttings are done in a year. Stop cutting and irrigation after July for seed production. 5 monds/acre seed and up to 1000 monds/acre fodder is produced from a well-developed crop.

1. **Kallar Grass (***……………..*)

**Botany and importance**

It belongs to family Gramineae. Kallar grass is very useful, multi-cut and forage. It can be cultivated in high Ph., barren and salt-affected soils. It provides nutrient enrich fodder in both black and white soil where soil water is salty. Kallar grass is full of carbohydrates and proteins and maintains sodium and potassium balance in animals. Kallar grass also have enough amount of iron, copper and manganese to fulfil the animal daily requirement. It is also cultivated to reclaim the salt-affected soils and to make the organic fertilizers.

**Climate**

It thrives in a warm and humid climate.

**Soil and seedbed preparation**

It can be cultivated in all types of soils. Seedbed can be prepared with one or two ploughings with a cultivar along with planking.

**Sowing time**

* **For irrigated areas** (sowing is done in start of March through seed)
* **For rainfed areas** (sowing is done in June or July through seed)

**Seed rate**

* Use 273 cuttings per acre

**Sowing method**

The broadcast method is used for seeds crop but sowing in lines one feet apart through drill gives better production. For cutting cultivation, bend the cuttings on one side making 45-degree angle with soil. Every cutting should have two buds; one should be above the soil other below the soil. As cultivation is done in dry soil, so irrigate the field immediately after sowing. Distance between lines and cuttings should be 2 feet.

**Fertilizer application**

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| **Crop** | **At sowing time** | **After each cutting** |
| Kallar grass | 2 bag nitrophos  | 1 bag urea |

**Irrigation**

Apply irrigation weekly until crop is fully established. After that apply irrigation after 2-3 weeks or as required.

**Insects**

Aphid attack is seen on this crop. Concern to agriculture extension staff to control attack.

**Time of harvesting and production**

1st cutting is done almost after three months of sowing. However, remaining cuttings are ready in 50-60 days at two feet plant height. Almost 4-5 cuttings are done in a year. Almost 400-500 monds/acre fodder is produced from a well-developed crop.

1. **Jantar (***……………..*)

**Botany and importance**

It belongs to family…………. Mostly Jantar is cultivated as green manure crop to increase the soil fertility. However, it is also cultivated as fodder in some areas. especially, it is favorite feed of small animals. Its seeds have high amount of gum.

**Climate**

It thrives in a warm and humid climate.

**Soil and seedbed preparation**

Light sandy loam soils are suitable for Jantar cultivation. Seedbed can be prepared with 2-3 ploughings with a cultivar along with planking.

**Sowing time**

This crop can be planted from mid-March to End-August.

**Seed rate**

* Use 20-25 kg per acre for fodder and green manure production.
* Use 10-12 kg per acre for seed production.

**Sowing method**

Usually broadcast method is used for sowing but sowing in lines one feet apart through drill gives better production. For seed crop, lines distance should be one feet and for fodder crop, distance should be 11/2-2 feet.

**Fertilizer application**

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| **Crop** | **At sowing time** |
| Jantar  | 1 bag DAP/acre  |

**Irrigation**

Apply irrigation after 18-22 days of sowing. After that apply irrigation as required.

**Insects**

Aphid attack is seen on this crop. Concern to agriculture extension staff to control attack.

**Time of harvesting and production**

* For green manuring, incorporate the crop in soil after 40-50 days.
* For fodder, cutting is done after 70-80 days at 50% flowering is done.
* Seed crop is harvested after 120 days when beans are ripened.