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कृषि विज्ञान की मासिक पत्रिका

किसान गज़ट

The Monsoon Arrives

Sowing Hope

Establishing the Kharif Crop

Kisan Gazette किसान गज़ट किश्न गज़ट किसान गज़ेट किसान गज़ेट किसान गज़ेट किसान गज़ेट
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Timely Sowing of Kharif Crops: Making the Most of the Monsoon

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Abstract

The timing of sowing is one of the most important decisions in kharif cultivation. Sowing at the right time, in relation to the onset of the monsoon, allows crops to make full use of the rains and establish before adverse conditions set in. This article discusses the principles of timely sowing, the risks of sowing too early or too late, and the practices that support successful crop establishment. Sowing decisions taken as the monsoon arrives set the course for the entire kharif season.

The arrival of the monsoon transforms the agricultural landscape, bringing the rains on which kharif cultivation depends. For farmers, the onset of the monsoon signals the start of the busiest and most decisive period of the year. Among the many tasks it brings, none is more important than sowing the crop at the right time, for the timing of sowing influences germination, growth, and ultimately the yield of the entire season.

Sowing is a matter of judgement as much as routine. The farmer must weigh the state of the monsoon, the moisture in the soil, and the requirements of the crop, and act at the moment that gives the crop the best start. Both haste and delay carry risks.

The Importance of Sowing Time

Every crop has a period during which sowing gives the best results, determined by its need for warmth, moisture, and a suitable length of growing season. Sowing within this window allows the crop to germinate promptly, establish a strong root system, and pass through its growth stages under favourable conditions, making full use of the monsoon rains.

When sowing is well timed, the crop's most sensitive stages coincide with periods of adequate moisture, and it matures before the rains withdraw or before pests and diseases build up. Timely sowing thus lays the foundation for a healthy, productive crop and reduces the risks that beset late or ill-timed sowing.

Risks of Sowing Too Early or Too Late

Sowing too early, before the monsoon is established, is a gamble. If the early showers are

followed by a dry spell, the young seedlings may wither for lack of moisture, forcing a costly resowing. Waiting for the monsoon to settle before sowing protects against this danger, ensuring that the moisture needed for germination and establishment is reliably present.

Sowing too late carries different risks. A delayed crop may face moisture shortage at the end of the season as the rains withdraw, or may encounter heavier pest and disease pressure. Late-sown crops often yield less than those sown in good time. Balancing these risks requires attention to the progress of the monsoon and the condition of the soil.

Assessing Soil Moisture and Monsoon Onset

The decision to sow rests above all on the availability of adequate moisture in the soil. A soil that has received sufficient rain to wet the seeding zone and that promises continued moisture offers the right conditions for sowing. Farmers judge this from the rainfall received, the feel of the soil, and the pattern of the developing monsoon.

Weather forecasts and advisories can assist this judgement, giving warning of the likely progress of the monsoon. Combining local observation with such information helps farmers choose the moment to sow with greater confidence and reduces the chance of being caught by a break in the rains.

Practices for Successful Establishment

Timely sowing is most effective when combined with good practice. Well-prepared land, quality seed of a suitable variety, appropriate seed treatment, and correct sowing depth and spacing all contribute to strong establishment. Preparing





the field in advance so that sowing can proceed promptly when conditions are right avoids the loss of precious days at the start of the season.

Where the monsoon is uncertain, choosing varieties suited to the expected length of the season, and having a plan for the possibility of delayed rains, adds resilience. Readiness to act quickly when the moisture arrives allows farmers to seize the narrow window that timely sowing requires.

Conclusion

Sowing the kharif crop at the right time is among the most consequential decisions a farmer makes each year. By waiting for the monsoon to establish adequate moisture, yet not delaying beyond the crop's optimal window, and by combining good timing with sound practice, farmers give their crops the best possible start. In a season shaped by the rhythm of the rains, timely sowing is the key to making the most of the monsoon.

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Direct Seeded Rice: A Water-Saving Alternative to Transplanting

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Abstract

Direct seeded rice offers a promising alternative to the traditional practice of transplanting rice seedlings into puddled fields. By sowing seed directly into the field, this method saves water and labour and can reduce the drudgery of rice cultivation. This article explains the principles of direct seeded rice, its advantages and challenges, and the management practices needed for success. As water becomes scarcer, direct seeding is emerging as an important technique for sustainable rice production.

Rice is the staple food of much of India and the mainstay of the kharif season across vast areas. Traditionally, rice is grown by raising seedlings in a nursery and transplanting them into flooded, puddled fields, a method that has served farmers for generations. Yet this practice consumes large amounts of water and labour, resources that are increasingly scarce and costly. Direct seeded rice, in which seed is sown directly into the field, offers a way to grow rice with fewer of these inputs.

As concern grows over the sustainability of water-intensive rice cultivation, direct seeding has attracted increasing attention. Understanding how it works, and how to manage it well, allows farmers to weigh its benefits against its challenges.

How Direct Seeded Rice Differs

In the traditional system, rice fields are flooded and puddled to create a soft, muddy bed, and seedlings raised in a nursery are transplanted by hand into this bed. The standing water suppresses weeds and provides the crop with moisture. This method is effective but demands abundant water and a great deal of labour for nursery raising, uprooting, and transplanting.

In direct seeded rice, seed is sown straight into the field, either into dry or moist soil, without the intermediate nursery and transplanting stages. This eliminates the labour of transplanting and, in many forms of direct seeding, reduces the amount of water required, as the field need not be kept continuously flooded from the outset.

Advantages of Direct Seeding

The most significant benefits of direct seeded rice are savings in water and labour. By dispensing with puddling and continuous flooding, the method can substantially reduce water use, an important advantage where water is scarce or expensive to pump. Avoiding the nursery and transplanting stages saves labour and reduces the physical drudgery of rice cultivation.

Direct seeded rice can also mature somewhat earlier, as the crop does not experience the setback that accompanies transplanting. This can help fit the rice crop into the cropping calendar and leave time for a following crop. The reduced water requirement further lessens the environmental footprint of rice production.

Challenges and Their Management

The principal challenge of direct seeded rice is weed control. Without the standing water that suppresses weeds in the transplanted system, weeds compete vigorously with the young rice crop and can cause serious yield loss if not managed. Effective weed management, through a combination of good land preparation, timely control measures, and appropriate practices, is essential for success.

Ensuring an even, adequate crop stand also requires care, as does managing water and nutrients to suit the direct seeded crop. These challenges are manageable with knowledge and attention, and experience and support from extension services help farmers adapt the method to their conditions.

Practices for Success

Success with direct seeded rice begins with good land preparation to create a level, well-drained





field that allows even sowing and effective water management. Using quality seed of a suitable variety, at the right seeding rate and depth, promotes a uniform, vigorous stand that competes better with weeds.

Careful attention to weed management throughout the early growth of the crop is the most important requirement. Combined with appropriate water and nutrient management, these practices enable the direct seeded crop to achieve yields comparable to transplanted rice while using less water and labour.

Conclusion

Direct seeded rice represents an important step toward more sustainable and less resource-intensive rice production. By saving water and labour and reducing drudgery, it addresses some of the most pressing challenges facing rice farmers. Although it demands careful weed management and good agronomy, direct seeding offers a practical path for farmers seeking to grow rice efficiently in a future of increasing water scarcity.

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Managing Waterlogging and Drainage During Heavy Monsoon Rains

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Abstract

Heavy monsoon rains, while essential for kharif crops, can cause waterlogging that damages or destroys standing crops. Excess water in the root zone deprives plants of oxygen and creates conditions favourable to disease. This article discusses the effects of waterlogging on crops and the measures farmers can take to manage excess water, including drainage, land shaping, and choice of tolerant crops. Good drainage management protects the kharif crop from the damage that heavy rains can bring.

The monsoon rains that sustain kharif agriculture can also, in their abundance, threaten it. When heavy or prolonged rainfall exceeds the soil's capacity to absorb and drain water, fields become waterlogged, and standing crops suffer. For farmers in low-lying areas and regions of heavy rainfall, managing excess water is as important as ensuring an adequate supply during dry spells.

Waterlogging is a common cause of crop loss during the monsoon, yet much of this loss can be prevented through drainage and other management measures. Understanding how waterlogging harms crops, and how to guard against it, helps farmers protect their fields when the rains are heavy.

How Waterlogging Damages Crops

When water fills the pore spaces of the soil, it displaces the air that roots need to breathe. Deprived of oxygen, roots cannot function properly, and the plant's uptake of water and nutrients is impaired. Prolonged waterlogging damages the root system, stunts growth, and, if it continues, can kill the crop. Most field crops, apart from rice, are sensitive to standing water around their roots.

Waterlogged conditions also favour certain diseases, particularly those affecting roots and the base of the stem, which thrive in the moist, oxygen-poor environment. The combination of oxygen starvation and disease can cause rapid and severe damage to an otherwise healthy crop.

Providing Adequate Drainage

The most direct defence against waterlogging is good drainage that removes excess water from the

field quickly. Drainage channels that carry surface water away, and outlets that allow fields to shed water into natural drains, prevent water from standing long enough to harm the crop. Ensuring these channels are clear and functioning before the monsoon is essential.

Fields prone to waterlogging benefit from drainage systems designed to suit their situation, whether surface drains to remove standing water or, in some cases, deeper drainage. Maintaining these systems, clearing blockages, and keeping outlets open ensure that when heavy rain falls, the water can escape rather than accumulate.

Land Shaping and Layout

The way land is shaped and laid out strongly affects how it handles heavy rain. Raised beds and ridges lift the crop above the level at which water collects, keeping the root zone drained even when furrows fill with water. This ridge-and-furrow arrangement is particularly useful for crops sensitive to waterlogging in areas of heavy rainfall.

Levelling fields to avoid low spots where water pools, and grading them gently so that excess water flows toward drains, further reduces the risk of waterlogging. Thoughtful land shaping, undertaken before the monsoon, builds resilience against the damage that heavy rains can cause.

Crop Choice and Contingency

In areas that are inherently prone to waterlogging, choosing crops and varieties that tolerate excess moisture reduces the risk of loss. Rice, which is adapted to standing water, is naturally suited to such conditions, while for other crops, tolerant varieties offer some protection. Matching the crop





to the drainage character of the land is a sound strategy.

Having a contingency plan for severe waterlogging, such as measures to drain fields quickly or to replant if a crop is lost, helps farmers respond to extreme events. Preparedness reduces the impact when heavy rains overwhelm normal defences.

Conclusion

The heavy rains of the monsoon are a blessing that can turn into a threat when they cause waterlogging. By providing good drainage, shaping land to shed excess water, choosing tolerant crops where appropriate, and preparing for extreme events, farmers can protect their kharif crops from the damage that standing water brings. Managing water in excess, as much as in shortage, is central to secure and productive monsoon agriculture.

Integrated Weed Management in Kharif Crops

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Abstract

Weeds compete fiercely with kharif crops for water, nutrients, light, and space, and if left unchecked can cause severe yield losses. Integrated weed management combines cultural, mechanical, and other methods to control weeds effectively and sustainably. This article discusses the impact of weeds on kharif crops and the components of an integrated approach to their management. A well-planned strategy keeps weeds in check while reducing reliance on any single method of control.

The warm, moist conditions of the monsoon that favour crop growth are equally favourable to weeds. In the kharif season, weeds emerge rapidly and grow vigorously, competing with the crop for the resources it needs. Left uncontrolled, they can rob the crop of a large part of its potential yield. Managing weeds effectively is therefore one of the most important tasks of the kharif season.

Relying on a single method of weed control has limitations, and integrated weed management, which combines several complementary approaches, offers more reliable and sustainable control. Understanding the components of this approach helps farmers keep weeds in check throughout the season.

The Impact of Weeds

Weeds compete with crops for water, nutrients, light, and space. Because many weeds grow faster than crops in the early stages, they can quickly overwhelm young plants, capturing resources that the crop needs to establish and grow. The result is

stunted crop growth and reduced yield, with the greatest damage occurring when weeds are allowed to compete during the crop's early, critical period.

Beyond direct competition, weeds can harbour pests and diseases, interfere with harvesting, and reduce the quality of the produce. Their seeds add to the weed seed bank in the soil, creating problems for future crops. Effective control thus protects both the current crop and the productivity of the field over time.

Cultural Methods of Weed Control

Cultural practices form the foundation of integrated weed management by making the crop more competitive and the environment less favourable to weeds. Good land preparation that destroys weeds before sowing, timely sowing that lets the crop establish ahead of the weeds, and appropriate crop spacing that allows the crop to shade the ground all help suppress weed growth.

Using clean, weed-free seed prevents the introduction of weed seeds, and crop rotation



disrupts the weeds associated with particular crops. Practices such as mulching smother weeds and conserve moisture, while a healthy, vigorous crop competes strongly against weeds on its own. These cultural measures reduce the weed problem before other methods are needed.

Mechanical and Manual Methods

Physical removal of weeds through hoeing, weeding, and inter-cultivation is a long-established and effective method, particularly for row crops. Mechanical weeding also loosens the soil surface, improving aeration and moisture penetration. Timing these operations to remove weeds while they are young, before they compete strongly or set seed, maximises their benefit.

Manual weeding, though labour-intensive, allows precise removal of weeds without harming the crop and is valuable where labour is available. Combining mechanical and manual methods with cultural practices provides substantial control while reducing dependence on other means.

An Integrated Strategy

Integrated weed management brings these methods together into a coherent strategy suited to

the crop, the field, and the weed problem. By combining cultural practices that prevent and suppress weeds with mechanical and manual control that removes those that emerge, farmers achieve more complete and durable control than any single method could provide.

An integrated approach also reduces the risk of weeds becoming difficult to control and lessens reliance on any one method. Planning weed management as part of the overall cropping strategy, and acting in good time, keeps weeds from gaining the upper hand during the critical early period of the crop.

Conclusion

Weeds are among the most persistent challenges of the kharif season, but integrated weed management offers an effective and sustainable response. By combining cultural, mechanical, and manual methods into a well-timed strategy, farmers can protect their crops from the heavy losses that unchecked weeds cause. A thoughtful, integrated approach keeps weeds in check while safeguarding the health of the crop and the productivity of the land.



Seed Treatment and Biofertilisers: Giving the Kharif Crop a Healthy Start

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Abstract

Treating seed before sowing and using biofertilisers are simple, low-cost practices that improve crop establishment, protect against early pests and diseases, and enhance nutrient availability. This article explains the purpose and benefits of seed treatment and the role of biofertilisers in kharif cultivation. Adopting these practices at sowing time gives crops a healthy start and can improve yields while reducing the need for chemical inputs.

The success of a crop depends greatly on how well it establishes in its first days and weeks. A vigorous, healthy start sets the crop on course for a productive season, while a poor start hampers it throughout. Two simple, inexpensive practices carried out at sowing time, seed treatment and the use of biofertilisers, can markedly improve the establishment and health of kharif crops.

These practices work at the very beginning of the crop's life, protecting the seed and young seedling and enhancing the supply of nutrients. Small in effort and cost, they can yield substantial benefits over the season.

The Purpose of Seed Treatment

Seed treatment involves coating or treating seed with protective substances before sowing. Its main purpose is to protect the seed and emerging seedling from soil-borne and seed-borne diseases and from early pest attack, threats that are especially serious during the warm, moist conditions of the monsoon when pathogens and pests are active.

By guarding the seed during germination and early growth, treatment improves the proportion of seeds that establish into healthy plants, ensuring a good, uniform crop stand. A strong, even stand is the basis of a productive crop, and seed treatment is a small investment that helps secure it.

Types of Seed Treatment

Seed may be treated with substances that protect against fungal and other diseases, and, for many crops, with beneficial microbial inoculants that support plant growth. The appropriate treatment depends on the crop and the pests and diseases

prevalent in the area. Treating seed is a simple operation that can be carried out on the farm shortly before sowing.

For legumes and certain other crops, treating seed with beneficial bacteria that fix nitrogen or otherwise aid the plant combines protection with nutrition. Such biological seed treatments overlap with the use of biofertilisers and contribute to both the health and the nutrient supply of the crop.

The Role of Biofertilisers

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Biofertilisers are preparations containing living microorganisms that enhance the availability of nutrients to plants. Some fix nitrogen from the air, making it available to the crop; others help solubilise phosphorus or otherwise improve the plant's access to nutrients. By harnessing these natural processes, biofertilisers supplement the supply of nutrients and can reduce the need for chemical fertilisers.

Biofertilisers are particularly valuable for legumes, which naturally partner with nitrogen-fixing bacteria, but they benefit many other crops as well. Applied to seed, to seedlings, or to the soil, they establish beneficial microorganisms that support the crop through the season and contribute to the long-term health of the soil.

Benefits and Adoption

Together, seed treatment and biofertilisers give the kharif crop a healthy start: protected from early threats and supplied with nutrients through natural means. These practices can improve crop establishment, growth, and yield while reducing dependence on chemical pesticides and fertilisers, lowering costs and benefiting the environment and soil health.



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Because they are simple and inexpensive, seed treatment and the use of biofertilisers are within the reach of all farmers. Guidance from extension services on the appropriate treatments and biofertilisers for particular crops and conditions helps farmers adopt these practices effectively and reap their benefits.

Conclusion

Seed treatment and biofertilisers are among the most cost-effective practices available to farmers, delivering benefits out of all proportion to their modest cost and effort. By protecting the crop in its earliest days and enhancing the natural supply of nutrients, they give kharif crops a healthy start and support productive, sustainable cultivation. Adopting these simple practices at sowing time is a wise step toward better yields and healthier soils.

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Intercropping in the Kharif Season: More Yield and Less Risk from the Same Land

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Abstract

Intercropping, the practice of growing two or more crops together in the same field, can increase total production, improve resource use, and reduce the risk of crop failure. This article discusses the principles and benefits of intercropping in the kharif season, the choice of suitable crop combinations, and the management it requires. By diversifying within the field, intercropping offers farmers a way to raise productivity and build resilience against the uncertainties of the monsoon.

Growing a single crop across a field is the familiar pattern of cultivation, but it is not the only one. Intercropping, in which two or more crops are grown together in the same field at the same time, is a practice with deep roots in Indian agriculture and enduring relevance. In the kharif season, thoughtfully chosen intercrops can increase the total yield from a field, use resources more fully, and spread the risk that the uncertain monsoon brings.

The idea behind intercropping is that different crops, grown together, can use the available light, water, nutrients, and space more completely than a single crop alone. When the crops are well matched, the field produces more in total, and the farmer gains other benefits besides.

Why Intercrop

The central advantage of intercropping is greater total production from the same land. When crops with different growth habits, rooting depths, or timing are combined, they complement rather than compete with each other, capturing resources that a single crop would leave unused. A tall crop and a short one, or a deep-rooted and a shallow-rooted crop, can share the field to mutual advantage.

Intercropping also spreads risk. If one crop fails or performs poorly, whether from adverse weather, pest, or disease, the other may still yield, protecting the farmer from total loss. This diversification within the field is a valuable safeguard in a season as uncertain as the monsoon, and it can also improve the household's food security by providing a variety of produce.

Choosing Crop Combinations

The success of intercropping depends on choosing crops that combine well. Good combinations pair crops that make different demands on resources or that occupy different parts of the field, so that they complement rather than compete. Pairing a legume with a cereal is a classic example, as the legume enriches the soil with nitrogen that benefits the companion crop.

Differences in maturity are also useful: a quick-maturing crop can be harvested before a longer-duration companion needs the full space and resources of the field. Matching the crops to the soil, climate, and season, and arranging them appropriately within the field, allows the combination to realise its potential.

Managing an Intercrop

Intercropping requires management suited to growing more than one crop together. The arrangement and proportion of the crops must be chosen so that each has room to grow and the main crop is not unduly suppressed. Sowing, spacing, and the timing of operations must accommodate the needs of both crops.

Nutrient and water management should meet the combined requirements of the crops, and pest and weed control must suit both. Although intercropping demands more thought than growing a single crop, the practices are well within the reach of farmers, and experience refines the management over time.

Benefits Beyond Yield

The advantages of intercropping extend beyond higher total yield. Including a legume improves soil fertility through nitrogen fixation, benefiting the current and future crops. A dense, mixed



canopy can suppress weeds and conserve soil moisture. The diversity of crops can reduce the build-up of pests and diseases associated with a single crop grown alone.

These benefits contribute to more sustainable and resilient cultivation. By diversifying within the field, intercropping strengthens the farm against the shocks of weather, pests, and market, while making fuller use of its land and resources.

Conclusion

Intercropping offers kharif farmers a way to raise the productivity of their land while reducing risk. By growing well-matched crops together, farmers can harvest more in total, enrich their soil, suppress weeds, and protect themselves against the failure of any single crop. In the uncertain conditions of the monsoon, this time-honoured practice remains a sound and sustainable strategy for productive and resilient farming.

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Monsoon Pest and Disease Surveillance: Early Detection for Timely Action

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Abstract

The warm, humid conditions of the monsoon favour the rapid development of pests and diseases in kharif crops. Regular surveillance to detect problems early allows timely, targeted action before they cause serious damage. This article discusses the importance of monitoring crops during the monsoon, how to scout for pests and diseases, and the principles of responding to what is found. Vigilance and early detection are the foundation of effective and economical crop protection.

The monsoon brings the moisture that kharif crops need, but its warm, humid conditions also create an ideal environment for pests and diseases. In this favourable weather, pest populations can build up rapidly and diseases can spread quickly, threatening crops that were healthy only days before. The farmer's best defence is vigilance: regular surveillance of the crop to detect problems while they are still small and manageable.

Detecting a pest or disease early, before it has spread widely, allows action that is both more effective and more economical than a response mounted once damage is severe. Making surveillance a routine part of monsoon crop management is one of the most valuable habits a farmer can adopt.

Why Surveillance Matters

Pests and diseases rarely appear all at once across a whole field. They usually begin in a few places or with a few individuals and then spread. If detected at this early stage, a problem can often be contained with limited effort. If it goes unnoticed until it is widespread, control becomes more difficult, more expensive, and less effective, and significant damage may already have occurred.

Regular surveillance also prevents unnecessary intervention. By knowing what is actually present in the crop and in what numbers, the farmer can decide whether action is needed at all, avoiding the waste and harm of treating a crop that does not require it. Surveillance thus underpins both timely action and the avoidance of needless expense.

How to Scout the Crop

Effective surveillance means walking through the crop regularly and examining it closely. Rather than glancing at the field from the edge, the farmer should move through it, inspecting plants at several points, looking at leaves, stems, and the growing points, and checking both the upper and lower surfaces of leaves where many pests and diseases first appear.

Attention should be paid to any signs of trouble: chewed or discoloured leaves, spots or lesions, wilting, the presence of insects, or patches where plants are doing poorly. Examining plants at different parts of the field gives a true picture of the crop's condition, as problems may be concentrated in particular areas.

Understanding What Is Found

Identifying the pest or disease correctly is essential for responding appropriately, as the right action depends on the specific problem. Farmers can learn to recognise the common pests and diseases of their crops, and can seek help from extension services when faced with an unfamiliar problem. Correct identification prevents mistaken and ineffective responses.

Judging the severity of a problem is equally important. Not every pest or trace of disease warrants action; intervention is justified when the threat to yield is real. Weighing the number of pests or the extent of disease against the damage they are likely to cause guides the decision on whether and how to respond.

Responding in Good Time

When surveillance reveals a problem serious enough to require action, responding promptly limits its spread and damage. The response should



be suited to the specific pest or disease and to the situation, favouring measures that are effective, economical, and least harmful to beneficial organisms and the environment. Early action, guided by accurate observation, is more successful than a belated one.

An integrated approach, drawing on cultural, biological, and other methods and reserving stronger measures for when they are needed, gives the best long-term results. Surveillance is the foundation of this approach, providing the information on which sound decisions rest.

Conclusion

In the pest-favouring conditions of the monsoon, vigilance is the farmer's most valuable ally. Regular surveillance to detect pests and diseases early enables timely, targeted, and economical action that protects the crop before serious damage is done. By making the scouting of crops a routine practice and responding wisely to what is found, farmers can safeguard their kharif crops and avoid the losses that unchecked pests and diseases bring.

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Soil and Water Conservation on Sloping Lands During the Monsoon

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Abstract

On sloping and undulating lands, the heavy rains of the monsoon can cause severe soil erosion, washing away fertile topsoil and reducing productivity. Soil and water conservation measures slow runoff, capture water, and hold soil in place. This article discusses the causes of erosion on sloping lands and the conservation practices that protect them, including contour cultivation, bunding, and vegetative measures. Protecting the soil during the monsoon preserves the productive capacity of the land for the future.

In the hills and undulating uplands where much of India's rain-fed farming takes place, the monsoon is both essential and dangerous. The rains that nourish the crops can also, on sloping land, strip away the soil itself. As water runs downhill, it carries with it the fertile topsoil on which productivity depends, leaving the land poorer with each passing season. Soil and water conservation measures are the means by which farmers protect their sloping lands from this loss.

Erosion is a slow but relentless thief, and its damage, once done, is difficult to reverse. Preventing it through appropriate conservation practices preserves both the soil and the water that would otherwise run to waste, sustaining the productivity of the land.

How Erosion Occurs on Slopes

On sloping land, rainwater that does not soak into the soil flows downhill as runoff. The faster and more concentrated this flow, the more soil it can dislodge and carry away. Heavy monsoon downpours generate large volumes of runoff, and on bare or poorly protected slopes this runoff can cause serious erosion, cutting channels into the land and removing the fertile surface soil.

The loss of topsoil is especially damaging because it is the richest layer, containing most of the organic matter and nutrients and much of the soil's capacity to hold water. As this layer is lost, the land becomes less fertile and less able to support crops. Runoff also carries away water that could have nourished the crop or recharged groundwater.

Contour Cultivation and Bunding

A fundamental principle of conservation on slopes is to work across the slope rather than up and down it. Cultivating along the contour, so that furrows and ridges run across the slope, creates barriers that slow the downhill flow of water, giving it time to soak into the soil and reducing its power to carry soil away.

Bunds, low banks of earth constructed along the contour, further check runoff, holding water and soil on the land. By breaking the slope into a series of gentler steps, bunding reduces the speed and volume of runoff and captures soil and water that would otherwise be lost. These structures are among the most effective measures for conserving soil and water on sloping farmland.

Vegetative Measures

Vegetation protects the soil in several ways. A cover of plants shields the soil surface from the direct impact of raindrops, which would otherwise dislodge soil particles, and the roots bind the soil, holding it in place against the flow of water. Maintaining vegetative cover, whether through the crop itself, cover crops, or grasses on vulnerable areas, greatly reduces erosion.

Strips of grass or other vegetation planted along the contour act as barriers that slow runoff and trap soil, complementing structures such as bunds. Planting vegetation on the steepest and most vulnerable parts of the land, and along drainage lines, protects the areas most at risk of erosion.

An Integrated Approach

Soil and water conservation is most effective when several measures are combined into an approach suited to the land. Contour cultivation, bunding, vegetative measures, and the



management of drainage lines work together to slow runoff, capture water, and hold soil in place. Planning these measures with attention to the whole slope, and ideally the whole watershed, multiplies their benefit.

Maintaining conservation structures and vegetation, and repairing any damage before each monsoon, ensures they continue to protect the land. Where conservation is undertaken across a watershed by the whole community, the benefits, in reduced erosion, better water availability, and sustained productivity, are greater still.

Conclusion

On sloping lands, the monsoon rains carry the threat of erosion that can rob the soil of its fertility. Soil and water conservation measures, from contour cultivation and bunding to vegetative protection, defend the land against this loss, slowing runoff, capturing water, and holding soil in place. By protecting their soil during the monsoon, farmers preserve the productive capacity of their land for the seasons and generations to come.

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Green Manuring: Enriching the Soil Naturally During the Rainy Season

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Abstract

Green manuring, the practice of growing a crop and ploughing it into the soil while still green, is a time-honoured method of enriching the soil naturally. During the rainy season, fast-growing green manure crops add organic matter, fix nitrogen, and improve soil structure. This article explains the principles and benefits of green manuring and how to practise it effectively. As a low-cost means of building soil fertility, green manuring supports sustainable and productive farming.

The fertility of the soil is the foundation of productive farming, and building it naturally, rather than relying solely on purchased fertilisers, is both economical and sustainable. Green manuring, one of the oldest practices in agriculture, does exactly this. By growing a crop specifically to be ploughed back into the soil while still green, farmers add organic matter and nutrients, enriching the land at little cost. The rainy season, with its warmth and moisture, is well suited to raising the fast-growing crops used for this purpose.

Green manuring works with natural processes to improve the soil, returning to it the organic matter and nutrients that intensive cropping depletes. Understanding how it works, and how to practise it, allows farmers to harness this simple and effective means of building fertility.

What Green Manuring Involves

In green manuring, a crop is grown not to be harvested but to be incorporated into the soil while it is still green and succulent. The crop is ploughed under before it matures, at the stage when its tissues are rich in nutrients and decompose readily. As it breaks down in the soil, it releases nutrients and contributes organic matter that improves the soil in many ways.

Leguminous crops are especially valued for green manuring because, in addition to the organic matter they provide, they fix nitrogen from the air, adding this important nutrient to the soil. Fast-growing crops that produce abundant green material in a short time are ideal, and the rainy season provides the conditions for their rapid growth.

Benefits for Soil Fertility

The addition of green manure enriches the soil in several ways. It supplies organic matter, which improves the soil's structure, its capacity to hold water and nutrients, and its biological activity. The decomposing green manure releases nutrients that become available to the following crop, and, in the case of leguminous green manures, adds nitrogen fixed from the air.

By improving soil structure, green manuring enhances aeration and water infiltration and makes the soil easier to work. The increased organic matter supports the community of beneficial soil organisms that contribute to fertility. Over time, regular green manuring builds and maintains the health and productivity of the soil.

How to Practise Green Manuring

Green manuring may be practised by growing a green manure crop during a fallow period, such as before the main crop, and ploughing it in before sowing the main crop. The rainy season allows a green manure crop to be grown quickly and incorporated in time for the following cultivation. Sowing the green manure crop, allowing it to grow to the appropriate stage, and then ploughing it into moist soil are the essential steps.

Incorporating the green manure while the soil is moist and warm hastens its decomposition, so that its nutrients are released in time to benefit the main crop. Allowing a suitable interval between incorporation and sowing the main crop lets decomposition proceed. With attention to timing, green manuring fits smoothly into the cropping calendar.



A Sustainable Practice

Green manuring is a low-cost, sustainable means of building soil fertility that reduces dependence on chemical fertilisers. By enriching the soil naturally, it lowers input costs, benefits the environment, and improves the long-term productivity of the land. It is a practice well suited to farmers seeking to farm sustainably while maintaining or improving their yields.

Combined with other practices that build soil health, such as the use of organic manures and appropriate crop rotations, green manuring contributes to a farming system that sustains its own fertility. In an era of rising fertiliser costs and

growing concern for soil health, this ancient practice retains great value.

Conclusion

Green manuring is a simple, economical, and sustainable way to enrich the soil, harnessing the growth of a green crop to add organic matter and nutrients to the land. Practised during the favourable conditions of the rainy season, it builds soil fertility, improves soil structure, and reduces reliance on purchased fertilisers. For farmers committed to the long-term health and productivity of their soil, green manuring remains a valuable and rewarding practice.

कृषि विज्ञान की मासिक पत्रिका

किसान गज़ट





Farm Machinery for the Kharif Season: Choosing and Maintaining the Right Equipment

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Abstract

Appropriate farm machinery can ease the heavy workload of the kharif season, improve the timeliness of operations, and reduce drudgery and cost. This article discusses the role of farm machinery in kharif cultivation, the considerations in choosing equipment suited to the farm, and the importance of proper maintenance. Selecting and caring for the right machinery helps farmers carry out operations on time and efficiently through the demanding monsoon season.

The kharif season concentrates a great deal of work into a short period. As the monsoon arrives, land must be prepared, crops sown, and a succession of operations carried out, often against the clock and in difficult conditions. Farm machinery, chosen and used well, can lighten this burden, allowing operations to be completed on time and with less labour and drudgery. Yet machinery represents a significant investment and requires care to serve reliably.

Deciding what machinery a farm needs, and keeping it in good working order, are important aspects of modern farm management. Thoughtful choices and proper maintenance ensure that machinery delivers its benefits when they are most needed, during the intense activity of the monsoon season.

The Role of Machinery in Kharif Operations

Farm machinery assists in many of the operations of the kharif season, from the preparation of land to sowing, the management of the crop, and eventually harvesting. By carrying out these tasks more quickly than manual labour, machinery helps farmers complete operations within the narrow windows that the season allows, an advantage that can be decisive when timeliness is critical.

Machinery also reduces the physical drudgery of farm work and can lower the cost of operations where labour is scarce or expensive. In easing the demands of the busy season, it enables farmers to manage larger areas or to carry out tasks more thoroughly than they otherwise could. These benefits make appropriate machinery a valuable asset.

Choosing the Right Equipment

The right machinery for a farm depends on its size, its crops, its soil, and the operations it needs to perform, as well as the resources available to the farmer. Equipment that suits a large holding may be unnecessary or uneconomical for a small one, and machinery must be matched to the tasks it will perform and the conditions in which it will work.

For small farmers, options such as sharing machinery, hiring it when needed, or using custom hiring services can provide the benefits of mechanisation without the full cost of ownership. Choosing equipment of appropriate size and capacity, and considering how fully it will be used, ensures that the investment is sound. Advice from extension services helps farmers make suitable choices.

The Importance of Maintenance

Machinery that is not properly maintained is liable to break down, often at the worst possible moment during the busy season. Regular maintenance, carried out before and during the season, keeps equipment reliable and prolongs its working life. Checking and servicing machinery before the season begins ensures it is ready when work starts.

Simple, regular care, cleaning equipment after use, checking for wear and damage, keeping moving parts in good condition, and attending to repairs promptly, prevents small problems from becoming serious ones. Machinery kept in good order works efficiently and reliably, repaying the attention given to it through years of dependable service.

Using Machinery Safely and Efficiently



Machinery must be operated safely, with due care for the operator and others. Understanding how equipment works, following safe practices, and giving proper attention while operating machinery prevent accidents and injury. Safety is an essential aspect of the use of farm machinery that must never be neglected.

Using machinery efficiently, operating it correctly, at the right settings for the task, and keeping it well maintained, gets the best performance from the equipment and the most value from the investment. Skilled, careful operation combined with good maintenance

ensures that machinery serves the farm well throughout the demanding kharif season.

Conclusion

Farm machinery, well chosen and well maintained, is a valuable ally in meeting the intense demands of the kharif season. By enabling timely operations, reducing drudgery, and improving efficiency, appropriate equipment helps farmers manage the busy monsoon period successfully. Choosing machinery suited to the farm, maintaining it with care, and operating it safely and efficiently ensure that it delivers its benefits reliably, season after season.

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