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Role of engineering for the development of rainfed agriculture in Pakistan- A review

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Abstract

The major problems of rainfed areas soil is low moisture content, topography, low soil fertility, uneven distribution of rainfall, soil erosion which leads to flooding and resultantly causes huge loses to agriculture and infrastructure. This situation often leads to the migration of local communities living in low land areas. To minimize the above mentioned problems it is need of the hour to apply engineering principles which could reduce these impacts. Deep tillage saves water in sub-soil to fulfill the crop requirements during the drought period. Precision land leveling reduces risk of runoff which required heavy earth moving machinery. Engineers may design high efficiency irrigation system, farm roads, farm buildings, machinery, agriculture lands, micro catchments to improve farm productivity and to make available water through-out the cropping cycle. In view of previous research studied in rainfed areas the role of agriculture engineers got much attention. The main role of agri. Engineers is to design, evaluation and optimization and value addition/ processing machinery. Evaluation and modification of the useful farm machinery according to the prevailing condition could be helpful to uplift the rainfed agriculture productivity. Promotion and adoption of mechanized farming is very necessary to fulfill the demands of burgeoning population. To improve the crop yield, optimization of inputs, viz., improved seed varieties, irrigation and utilization of latest machinery is very important. It could also be helpful for the development of methodology/techniques to reduce postharvest losses and atomization of different crop production, processing and storage.

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Introduction

Dryland cultivating is commonly characterized as cultivating in areas where absence of soil dampness limits yield or field creation to part of the year. Dryland cultivating frameworks are differing, including an assortment of moving agribusiness frameworks, yearly croplands, home gardens and blended horticulture domesticated animals frameworks. Drylands are an indispensable piece of the world's human and physical situations.

They envelop prairies, agrarian terrains, woods and urban territories. Dryland environments assume a significant job in worldwide biophysical forms by reflecting and retaining sunlight based radiation and keeping up the parity of climatic constituents (Ffolliott *et al.*, 2002). Therefore the study could also be helpful for the development of methodology/ techniques to reduce postharvest losses and atomization of different crop production, processing and storage.

Distribution of Drylands in the World

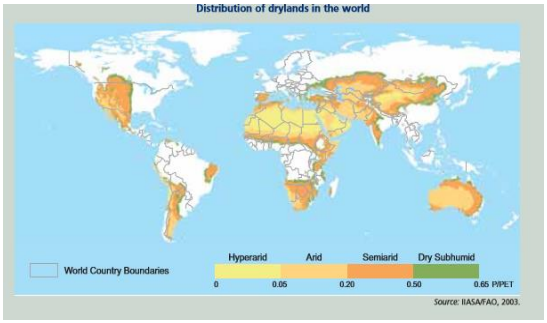

Fig. 1. The starting point, structure and physicochemical properties of soils in dry lands are different. They have, by and wide, Calcisols, Gypsisols. Leptosols and soils of steppe (FAO, 2004). Dry land is owned by more than 2 000 million people, about 40% of the total population (White and Nackoney, 2003).

Table 1. Total cereal area, yield and production in rainfed Asia and sub-Saharan Africa: 1995 baseline data compared to 2025 projections.

Country	Area (m ha)	Yield (mt/ha)	Production (m ha)	Rainfed Area (%)	Rainfed Production (%)
South Asia	67.9 (55.3)	1.20 (1.65)	81.5 (91.24)	54.1	36.2
India	62.3 (49.8)	1.20 (1.63)	74.6 (81.4)	62.2	42.7
Pakistan	00.8 (00.9)	0.60 (0.93)	00.5 (00.8)	07.4	02.3
Bangladesh	01.9 (01.6)	1.35 (2.03)	02.6 (03.3)	24.9	13.5
Other South Asian countries	02.9 (03.0)	1.35 (2.16)	03.9 (06.5)	43.5	39.2
Southeast Asia	29.8 (31.4)	1.61 (2.46)	47.9 (77.8)	60.8	45.0
Indonesia	06.6 (05.9)	1.70 (2.44)	09.6 (14.5)	38.1	23.3
Thailand	08.8 (09.1)	1.52 (2.08)	13.3 (19.0)	80.7	70.4
Malaysia	00.3 (00.3)	1.45 (1.78)	00.4 (00.5)	35.9	25.6
Philippines	03.9 (04.5)	1.49 (2.46)	06.9 (11.2)	60.1	50.8
Vietnam	03.6 (03.5)	1.68 (3.19)	010 (16.0)	48.8	33.5
Myanmar	06.3 (05.7)	1.87 (2.80)	02.7 (06.3)	85.3	79.8
Other SE Asian Countries	02.2 (02.4)	1.22 (2.22)	96.7 (133.47)	92.9	88.8
East Asia	27.1 (30.5)	3.54 (4.59)	94.0 (137.5)	29.5	26.1
China	26.2 (29.6)	3.59 (4.65)	00.6 (00.8)	29.6	26.3
S Korea	00.2 (00.1)	3.29 (6.01)	00.7 (00.8)	16.1	12.5
Japan	00.2 (00.2)	3.28 (3.72)	01.0 (1.00)	09.7	07.5
Other East Asian Countries	00.6 (00.6)	1.57 (1.70)	44.3 (86.8)	36.2	24.8
Sub-Saharan Africa	53.2 (74.0)	0.83 (1.18)	18.8 (39.7)	96.4	93.0
Nothern sub-Saharan Africa	29.0 (40.6)	0.65 (0.98)	9.2 (15.5)	96.4	92.1
Eastern sub-Saharan Africa	6..5 (8.3)	1.42 (1.88)	8.7 (17.6)	98.0	97.1
Central & Western sub-Saharan Africa	9.6 (14.5)	0.91 (1.21)	7.7 (14.0)	98.0	96.8
Southern sub-Saharan Africa	8.1 (10.6)	0.95 (1.33)		93.4	87.6

Source: Rosegrant *et al.* 2002.

Development of dry land farming

Improvement of dry land cultivating in steppe, water-preservation procedures must be created on the grounds that dampness from occasional precipitation was typically insufficient for crop development and development (El-Swaify *et al.*, 1985). In any case, summer neglected is extremely compelling in decreasing danger and guaranteeing some crop even in low-precipitation centuries (Lal and Pierce, 1991). Cautious cultivating observes, for example, weed controller, upkeep of a growth straw and leaving the exterior in enormous blocks can bring about bigger measures of put away water.

Goals for improving and sustaining the productivity of dryland areas include

Development in the vocations of individuals living in dry land zones; A move from regular agribusiness to a more preservation successful horticulture (for example selection of agro-biological system approaches and preservation horticulture); A more prominent commitment of dry land areas to the

development and improvement of nationwide frugalities; A continued profitable existence of dry lands by capturing the procedures of land debasement; restoration of genuinely corrupted land; Approval and range of dry land-the board frameworks that are monetarily and socially feasible and ecologically maintainable; Enhanced basic leadership capacities of nearby, nationwide and local (for example waterway bowl level) organizers.

Effects of Climate Change

Worldwide increment in barometrical convergences of (CO_2) and other ozone harming substances (especially methane) in the course of recent years are credited principally to non-renewable energy source ignition and plot usage variation (counting entomb alia deforestation, biomass consuming, depleting of wetlands, furrowing and utilization of manures) and now far surpass pre-modern qualities decided from ice centers spreading over a large number of years (IPCC, 2007).

The worldwide climatic convergence of carbon dioxide has expanded from a pre-modern estimation of around 280 ppm to 379 ppm in 2005 (IPCC, 2007). The climatic convergence of carbon dioxide in 2005 surpasses by a wide margin the common range in the course of the most recent 650,000 years (180 to 300 ppm) as decided from ice centers (IPCC, 2007).

Dry land Characteristics

Dry land soil and yield the executive rehearses are generally crude, combined with impediment of precipitation vulnerability/dampness stress, soil disintegration, and supplement exhaustion. In this high-chance condition, utilization of farming sources of info is negligible: composts and upgraded seed are barely utilized (Rashid *et al.*, 2002a, 2002b).

Harvest buildups are utilized essentially as a wellspring of food for creature, and as a fuel through rustic networks. The monetary estimation of such deposits, utilized as food, can approach or surpass the seed, especially in 'poor' precipitation years (Rees etal., 1991).

People of dry lands

The populace circulation designs change inside every area and amongst the atmosphere regions containing dry lands. Roaming individuals are found in peaceful gatherings that rely upon domesticated animals for subsistence and, at whatever point conceivable, cultivating as an enhancement. We travel in search of land and water for their creatures after the intermittent conveyance of precipitation. Semi-traveling people are also found in peaceful gatherings that are usually animal-dependent and practice agrarian growth at a base camp, where they return for different periods Transhumant populations join the creation of cultivating and domesticating animals during positive seasons, however they may occasionally move along ordinary courses using examples of altitudinal changes in vegetation development when rummage is used to touch less in the cultivating territory. Stationary (smallholder) ranchers conduct rain fed or watered farming on a regular basis (Ffolliott *et al.*, 2002) together with the production of domesticated animals.

Land Use Systems

Dry land cultivating is commonly characterized i.e. cultivating in districts wherever absence of soil dampness bounds yield or field generation to portion of the year. Dry land cultivating frameworks are extremely different, including an assortment of moving agribusiness frameworks, yearly croplands, home gardens and blended horticulture domesticated animals frameworks, additionally migrant peaceful and transhumant frameworks. They additionally incorporate neglected frameworks and different indigenous strengthening frameworks (FAO, 2004) for soil dampness and soil richness reclamation. Haas, Willis and Bond (1974) characterized decrepit as a cultivating training. Significant cultivating frameworks of the dry lands fluctuate as per the agro-environmental states of these areas. An ongoing investigation of the Land Degradation Assessment in Dryland ventures (LADA, 2008) recognized the significant cultivating frameworks in dry lands as per financial data, agro-biology and potential outcomes for water system. Most of the drylands utilized for horticulture is under Oat development. Extension 2 abridges cultivating rehearses in a portion of the major dryland regions of the world.

Land Degradation in Drylands

Quick populace development in dry lands because of upgrades in wellbeing circumstances and different elements has set huge weight on the common asset base. Regularly, the inescapable consequence of expanding populace in asset poor regions is land debasement characterized (FAO, 2000a). In unique circumstance, this ought to be comprehended because of a blend of normal procedures and human exercises that reason the land to get unfit to appropriately support its environmental and financial capacities (Gisladottir and Stocking, 2005).

In any case, considers in the course of the 20 years reason that the reasons for land corruption are unquestionably progressively mind boggling and that land debasement may result from a lot more elevated level arrangement and market disappointment as opposed to from disappointments of the humble land client (Gisladottir and Stocking, 2005). Dry lands have been dismissed by national and global advancement strategies - satisfactory ventures to produce positive outcomes and turn around land debasement have been inadequate (Johnson, Mayrand and Paquin, 2006).

The worldwide increment now air centralizations (CO_2) and additional ozone harming substances (especially methane) in the course of recent years are ascribed principally to petroleum product ignition and plot usage variation and now far surpass pre-mechanical qualities decided from ice centers crossing a large number of years (IPCC, 2007). The worldwide air centralization of carbon dioxide has expanded from a pre-mechanical estimation of around 280 ppm to 379 ppm in 2005 (IPCC, 2007). The environmental grouping of carbon dioxide in 2005 surpasses by a wide margin the regular range in the course of the most recent 700,000 years as decided from ice centers (IPCC, 2007). There is generous logical proof that the ongoing quick modifications in the world's atmosphere are human-actuated, brought about by these gatherings of CO_2 and additional ozone depleting substances and have developed a genuine and earnest problem (Stern, 2006). Generally acknowledged expectations display that the example of environmental variation won't just increase hotness, however will likewise heighten the water rotation, fortifying current examples of water shortage and bounty, expanding the danger of dry seasons and overflows. Likewise, as the world warms, the danger of unexpected and enormous scale changes in the atmosphere framework will rise – additionally the recurrence and force of extraordinary occasions are probably going to expand (Stern, 2007). Tubiello and Fischer (2007), be that as it may, expressed in the wake of taking into accout foreseen effects of environmental change and moderation that as far as grain generation, the effect on danger of yearning is just felt after 2050.

The Role of Irrigation in Cereal Production

20% of the total populace don't approach protected and reasonable drinking-water. Despite the fact that individuals utilize just a little part of inexhaustible water assets all around, this portion is a lot greater in numerous parched and semi-bone-dry stream bowls wherever water is rare (FAO, 1996a). The World Bank (2000) announced that portion of extricated water utilized for agribusiness ran from 88 percent in low-pay nations, through 75 percent in center salary nations, to 35 percent in great pay nations. Later on, the manner by which water is overseen will dramatically affect water system and along these lines on nourishment generation. Cosgrove and Rijsberman (2000) think about that decrease in pace of development of flooded farming is vital for manage the water emergency.

Water for water system extension is getting more diligently to discover and all the more expensive to create. Groundwater exhaustion is additionally a significant issue in the world.

Role of agricultural engineering to enhancing cereal production in Dry lands

1) Terraces

Patios have been utilized for quite a long time as a method for controlling overflow and disintegration. As a result of the decent variety in conditions where patios are utilized, cautious plan is important to decide the most proper kind of porch for a particular area. Seat porches are maybe the most established sort of patio.

They were utilized essentially in regions where the inventory of rural land was restricted and where populace pressure constrained development up soak slants (Sandor and Eash, 1995). The development of patios has proceeded as of late, especially in nations with constrained land and high populace pressure. In spite of their numerous advantages, the utilization of patios has diminished as of late for a few reasons. They are expensive to build and keep up, besides terraced land is increasingly hard to cultivate, especially with huge gear. The development of patios may likewise bring about soilfertility issues since topsoil is covered or moved downslope. Porches are likewise dependent upon disappointment during huge, serious precipitation occasions, bringing about significant harm that is exorbitant to fix (WOCAT, 2007).

2) Conservation Bench Terraces

Protection seat patios (CBTs) or Zingg porches are a kind of precipitation multiplier. They utilize a piece of the land surface as a catchment to give extra spillover onto level porches on which harvests are developed (Zingg, 1955). The information from these preliminaries gave general rules on the strategy, however standard plans ought to be stayed away from in view of the wide variety in the states of the dirt, precipitation and cultivating framework. The most ideal method for applying the framework in a specific circumstance ought to consistently be researched locally. The fundamental use of framework is build the profit and the dependability of income wherever precipitation is about adequate for yield generation. As a result of significant expense of establishment of CBTs, it isn't fitting at extremely little rains. Successful the likelihood of getting a sensible harvest might be a higher priority than mathematical increment in yield (FAO, 1987).

3) Contour Furrows

Shape wrinkles (or form bonds and desert strip cultivation) are a slight deviation from the subject of surface management, requiring less soil growth than conservation seat patios, and are required to be used by small ranchers or in lower precipitation regions. Usually, the trimming is irregular on strips or in rows, neglecting the catchment area left (FAO, 1987). The guideline is similar to CBTs, that is to collect overflow from the catchment to increase the edited territory's soil dampness.

Wherever the shape wrinkles are not spread exactly on form, or worked along with certain anomalies, here might be a threat of lopsided profundities. Littler bonds at the right edges can reduce this. Nevertheless, even with tied ridging, these bunds should be lower in stature than the basic edges so that any overtopping will be horizontal along the shape and not over the bundle and down the slant. Again and again, the focus is on the exhumed wrinkle that collects water so that the spillover will flood without damage in exceptional storms.

4) Contour Bunds

In addition, type bunds are used for a mixture of soil protection and water preservation in Ethiopia. The bunds are based on a standard assessment of the bowl's links. A stone splitter is placed on the lower side of the earth bund and attempts to reduce harm if the bowl is flipped (Hurni, 1984; Smith and Critchley, 1983).

5) Land levelling

Land leveling with laser is the best methods for rationing overflow and forestalling soil disintegration (Box 1). Be that as it may, in light of the fact that it is additionally the most costly, this technique has not been utilized generally aside from in territories with outrageous land and water deficiencies (Jones, Unger and Fryrear, 1985).

6) Tied Ridges

Seeding plants on the form can adjusted to a wide range of culturing, including diminished culturing and no-culturing frameworks, and this is enthusiastically suggested. Under motorized frameworks, the wrinkle dykes are typically decimated by culturing and must be recreated every year. They can likewise turn into a deterrent during development or collecting activities. Maybe the most significant motivation behind why more ranchers don't receive this innovation is that, while the extra

exertion is extensive, this doesn't expand yields in certain years (Stewart and Steiner, 1990). Throughout the time of examination, next to zero spillover into equal parts the years and, regularly, a few years without overflow happened in grouping. While the accentuation in semi-parched locales is typically on forestalling overflow to build the measure of water accessible for crop generation, the counteractive action of spillover can prompt genuine disintegration issues if a lot of water aggregates. Water-the executives procedures must be sitespecific. The most significant components are the dirt stockpiling qualities and the dissemination of precipitation as for the developing season (El-Swaify *et al.*, 1985).

7) Laser land levelling in Morocco

Methodologies for successful the effectively accessible water system frameworks are being formulated in Morocco. For instance, so as to enhance ranch water system, laser-leveled bowl water system has been presented on various homesteads in the Tadla locale. Exhibits on certain homesteads demonstrated significant advantages in water sparing of 25percent and yield increments of 35 percent. Extra homestead efforts were upgraded by 15% and there were work investment funds of 55percent. The consistency of water system was around 95% (IPTRID, 2001).

8) Water Harvesting

Gathering water can be followed back to the ninth and tenth Century (GRDC, 2008). Individuals in south and Southeast Asia gathered water from rooftops and from straightforward dams developed from brush (GRDC, 2008). A dainty mud coating was commonly placed on base of the lakes to limit drainage misfortunes (UNEP, 1982).

Bamatraf (1991) expressed that ranchers in Yemen will in general use water-reaping procedures where precipitation isn't adequate. In this way, a few methodologies can be considered, including: overflow farming, where spillover is focused on a littler territory, for the most part utilized for arable or perpetual harvests; and spillover stockpiling, by and large in little repositories, used to enhance precipitation – frequently in agriculture or for domesticated animals or local use (Perrier and Salkini, 1991). Water reaping is here and there rehearsed with the essential goal to raise the water table to advance or support water system improvement. Kerr (2002) and Batchelor *et al.* (2002) explored and condensed the effect of numerous watershed extends in India. Batchelor *et al.* (2002) recognized that various types of water gathering have utilized effectively in semi-bone-dry territories for centuries as a methods for securing local water supplies and expanding or balancing out rural generation. Acknowledged shrewdness has been that precipitation ought to be beyond what many would consider possible be reaped where it falls and that these advancements are absolutely kindhearted. They found, in any case, developing proof that water collecting in semi-parched zones, whenever utilized improperly, can prompt discriminatory extra water assets and, in the outrageous, to untrustworthy water.

Dryland farming technologies

Given the extreme deficiency of water assets, water system alone can't fulfill the water request in horticultural generation and it is important to endeavor endeavors to advance dry land cultivating improvement. Generally, precipitation happens during spring and late-spring. Simultaneously, water misfortunes and waste in ranch land water system are not kidding. Around 25 percent water is lost from trenches as drainage, permeation and vanishing during movement and appropriation. Thus, around 24 percent water misfortunes happen from major and minor water courses. In addition, 30 percent water is lost during field application inferable from faulty water system techniques. Resultantly, water system productivity of our channel framework named as one of the biggest trench organizes on the planet stays exceptionally poor.

Soil barrenness in dry land cultivating because of dreary harvest structure that incorporates primarily oats and less vegetable yields likewise influences crop generation unfavorably. Additionally, desertification and disintegration are different issues in dry land cultivating territory. Every one of these elements add unsteady horticultural return.

Profit of harvests in land cultivating is extensively little contrasted with that of watered cultivating. Unfortunate degree of aptitudes, absence of instruction and reduced financial conditions are likewise the reasons of low rural yields in dry land cultivating. Ranchers to a great extent practice broad cultivating with poor collect. The importance of dry soil cultivated in economic horticultural growth is important for the production of dry soil cultivated on major routes. Improving the limit on the conservation of dirt by moisture, retaining rainfall by using agronomic, organic and designing steps to boost soil maturity, improving cultivation practices and using resources such as light, heat, soil, compost, water and improved seeds to increase rural productivity in dry land should be the targets for the advancement of dry land agribusiness. Terracing is an important activity in the dry land area to be accepted. It aims to build incline land in shape patio with an edge below 25 degrees. It is on the grounds that slant land with a point of 10-25 degrees is helpless to soil disintegration because of huge edge, soak slant, visit cultivating exercises and high development coefficient, especially ill-advised cultivating rehearses.

Utilizing cultivating rehearses like dampness maintenance mulched wrinkle, machine wrinkle boring and huge wrinkle help to build dynamic soil layer, improve dampness maintenance limit and soil fruitfulness, decrease soil vanishing and improve eco-framework. Building water reservoirs to store rainfall is possible in incline land and patio land as useful water system water for agri-business. If there should be an occurrence of genuine dry season, such water could be utilized for dribble water system to expand soil dampness. Because of restricted capacity of water i.e. innovation is typically utilized collected with additional water-sparing estimates, for example, wet planting, plastic mulching, root-zone dribble water system, opening water system with mulching to improve crop protection from dry spell and upgrade stable high return. Wheat cultivating with plastic film could get significant leap forward expanding wheat yield in these regions. Mulching with crop deposits includes effectively available material, ease, high productivity, water sparing, dampness maintenance, fruitfulness improvement, yield increment and no defilement to soil.

Seed covering with dry spell safe synthetic specialists created as of late like water-maintenance operator, vanishing suppressant and soil controller could bring excellent outcomes requiring little to no effort when utilized during a period of dry season.

Treatment goes for utilization of concoction manure, natural compost and green compost to improve soil richness and respect improve soil protection from dry season through the improvement of soil fruitfulness. To set up sane and successful dry land cultivating, it is basic to build level of vegetable and green compost crops, increment manure contribution by consolidating natural compost with synthetic compost and improve logical treatment level and join cultivating with richness improvement. Expanded utilization of compound manure on dry land cultivating could realize twice as a lot of yield as on flooded land.

Utilizing dry season suffering assortments is the most practical yield expanding innovation. At present, most dry regions have their very own assortments with great dry spell obstruction. Anyway after quite a while, most assortments have encountered debasement in their exhibition. Furthermore, the rearing of new assortments is as yet lingering behind. It is a pressing need to create dry spell – safe assortments and quicken the cleansing and revival process so as to improve yield.

Last however not the least, transforming the cultivating framework as per winning neighborhood conditions in an offer to rearrange crop structure, abstain from flooding and dry season and improve pay is basic. Also, look into on and improvement of dry spell suffering and dry spell safe assortments and coordinating innovation, setting up showing bases for defensive cultivating innovation to create specialized limit in this field, conducing specialized trade so as to prepare a spine group of expert furnished with cutting edge dry land cultivating innovation, building up a gathering of homestead instruments and machines

appropriate for dry land cultivating and elevating monetary assets to help the expansion of cutting edge dry land cultivating innovation in the poor zones would accomplish manageable horticultural generation on dry land ranches.

Challenges and opportunities facing dryland agriculture

The test of dryland advancement is to make an empowering situation where nearby individuals can improve their employments by utilizing their assets all the more profitably. Research has appeared (Anderson *et al.* 2003) that even the most unfortunate can be viewed as self-ruling, dependable, exploratory, and, however riskaverse, additionally creative and pioneering. Imperatives, not obliviousness, deflect poor people. They should be offered decisions of, and access to, proper advancements, practices, data and experience inside a compensating financial and institutional condition.

This area expounds on the proceeding with difficulties confronting dryland horticulture: diligent neediness, water shortage, environmental change, land corruption, and others. An elaboration of these difficulties is exhibited, after which the open doors for dryland horticulture are talked about.

Reasons of Low Productivity

Different elements incorporate poor dampness preservation, little or potentially divided land property, rare capital and work, and crude strategies for development (i.e., development of low-yielding nearby assortments, insufficient manure use, poor weeding, and negligible automation). Significant difficulties of rain fed horticulture include dependable precipitation estimate, improved water reaping, dampness protection and use, reception of dry spell tolerant, high-yielding assortments, productive utilization of the costly homestead inputs, particularly composts, and better range the executives and editing frameworks. As watered farming is the main thrust in Pakistan's economy, to a great extent in view of guaranteed dampness supply and better administration.

Rainfed Agriculture Education

Dryland farming in Pakistan had gotten nearly less consideration comparative with watered agribusiness, until the mid 1960s, when various missions upheld by the Food and Agriculture Organization (FAO) of the United Nations, World Bank, and Canadian International Development Agency (CIDA), assessed barani (rainfed) horticulture in the nation and thought about means for improving its profitability.

The Barani Commission, comprised in 1975 by the Punjab Government, checked out the circumstance and accentuated creating fitting advancements for understanding the capability of these regions.

Strategies for Dryland Agriculture

Dryland territories of Pakistan are assorted as to their dirts, atmosphere, asset base, generation frameworks, socio-financial matters, and statistic highlights. Accordingly, their improvement potential can't be gathered comprehensively for procedure arranging and its usage. Truth be told, even inside a characterized agro biological zone, the procedures must be custom fitted to suit neighborhood/ provincial circumstance. Rainfed investigate proposes the plausibility of considerable potential for improving efficiency per unit zone.

Therapeutic measures for upgrading dryland efficiency incorporate arrangement of sufficient credit offices; guaranteed advertise request; least help cost for rainfed situated items like oilseeds, heartbeats, and nut; viable water gathering, protection and use; land solidification; arrangement of good quality seed; compelling supplement the board; and weed control. There has been an acknowledgment of the issues and possibilities of dryland farming in Pakistan, which additionally has the upside of approaching the applicable work/data somewhere else. In any case, the genuine activity is to assess and embrace known and demonstrated advances. So as to understand the capability of Pakistan's dryland farming part, some required activities in the zone of innovative work are:

- Development of site-explicit advancements for water collecting, dampness protection, soil the executives,

crop generation, go the executives, agroforestry, and domesticated animals.

- Effective dispersal of proper agrarian advances to end clients.
- Arrangement of sufficient rural credit, and arrangement of homestead inputs (like great quality seed, manures, and so forth.) and ranch apparatus.
- Introduction of compelling help value system for explicit dryland crop produce.
- Land solidification of divided possessions in dryland regions to assist ranchers with dealing with their properties in a progressively successful way.
- Development of agro-based, work concentrated businesses in the rainfed regions.
- Education and preparing of ladies in the important agro-based undertakings.
- An exhaustive program of huge scale groundwater energize measures, including building of check dams, re-afforestation, and controlled

Conclusion

Engineers contribute a lot for the development of rain fed area. Main focus of engineers was on enhancing number tractors and other farm equipments. Due to increasing population and urbanization land size decreased, engineer need to improve design specification of farm equipments as per requirements. For off-season and year round supply of vegetable innovative greenhouse engineering should be adopted. To increase farm productivity start R&D activities and capacity building of agriculture graduates, extension worker and drying farmers. In Pakistan optimum level of mechanization has achieved, which results in enhancing farm productivity. However, proper post harvest facilities are not available. To reduce post harvest losses and to increase farm productivity solar drying technology should be adopted for value addition. To develop market linkages for the supply of value added products for the national and international market.

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