



Automation in Agriculture and On-ranch Agro-handling: A Review

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ABSTRACT

This paper studies the work completed by different specialists to get an all-encompassing picture of the present status of execution of robotization in rural practices throughout the planet. World Food and Agriculture Organization (FAO) said the total populace is relied upon to arrive at 9.1 billion by the year 2050, so take care of this populace food creation ought to be expanded by essentially 70%. Robotization of cultivating rehearses has been demonstrated to expand the food creation levels. Non-industrial nations need to twofold their food creation. The customary strategies for cultivating and consistently diminishing homestead work accessibility are making horticulture monetarily unviable and wasteful. In the above setting research on the advancement of insightful, self-ruling apparatus for conveying agrarian activities is fundamental to work on the amount and nature of the horticultural produce. Today there is a dire need to resolve the issues like unpredictable utilization of agrochemicals, protection of energy, control on ecological contamination and impacts of a worldwide temperature alteration.

Key words: Agro synthetics, Automation, Farming, Motorization, Sensor organizations.

Motorization in basic tents is the interposition of further developed instruments, executes, machines and other hardware among man and materials. In horticulture, materials are soil, water, climate, seed, compost, pesticides, development controllers, water system, water agrarian produce and results, for example, food grains, oilseeds, products of the soil, blossom and different ornamentals, flavors also, toppings, cotton, jute and k~naf, milk, meat, eggs, fish and so forth. There is the degree of motorization in each unit activity of creation agribusiness, post-reap the executives and provincial living (Alam, 1999). It is coordinated to upgrade laborer's yield, increase human exertion, supplement and substitute human work that is empowering also, eliminating avoidable drudgery or stress that unfavorably influence human mental resources prompting blunder, imprecision and perils and at last loss of effectiveness. It bestows poise to work eliminating restrictions related to certain fans' tasks. It adds to horticultural efficiency by guaranteeing idealness, accuracy in metering and situations of sources of info affecting the economy in input use simultaneously empower plants and creatures to articulate their thoughts better. Further developed cycle and hardware and the board procedures help in the preservation of agrarian produce, buildups and side-effects against subjective and quantitative harms, val~e expansion, agro-handling businesses producing extra pay and work. Automation is likewise required in homegrown exercises and rustic living (Alam, 2000). Motorization represents the modernization and material culture of any general public. To upgrade the monetary advancement of all partners. To create work to battle caprices of joblessness issue. To improve the per capita payments to limit the contrast between provincial and metropolitan. To work on dietary guidelines for the improvement of wellbeing.

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Improvement of mechanization in agriculture

Motorization has its underlying foundations in ancient times. Harappan individuals around 2500 BC changed themselves from tracker finders to settled fanners-cum-semi pastoral animals herders. It was made conceivable by going before innovations, in Paleolithic periods like around 50,000 BC kindling as burrowing apparatus, stone and bone apparatuses for burrowing, cutting. Agro-peaceful life fonts began showing up around 6000 BC (Alam, 2000). Taming of plants and creatures, development of instruments and carries out, abilities and extras of utilizing draft creatures for farming and transport during Neolithic periods (5000-3000 BC). They designed furrows, trucks, boats, fishing snares, nets and traps, grain-stockpiling and essential handling hardware. Great storage facilities of Harappa had air circulation sections, saddle querns and mortar and pestle around stockpiles work there for essential handling. With copper refining during the Chalcolithic period (3000-700 BC) and later its combination bronze, these apparatuses and execute got refined and made more sturdy. Harappan human advancement with its urbanization, global exchange thrived during the Bronze Age. Be that as it may, it was during Iron

Age (1000 BC), a persistent assembled up over the Chalcolithic and Bronze Ages, the iron metallurgy proclaimed another period of social headways and mass developments in agrarian ways of life (Alam and Ilyas, 2001). Iron which is significantly more sturdy, accessible in bounty and modest became the chief metal for instruments utilized for backwoods clearing and extension of fanning towns. By 400-300 BC utilization of iron was normal all over India however going before ages apparatuses and supplies existed all the while in distant sloping and woods regions, a marvel that perseveres even today. An audit of the customary rural hardware still in use sets up that devices, carries out and transport vehicles created during the Harappan time frame are their ancestors. Over the ages, the fundamental plans have stayed the same aside from enhancements in materials of development, metallurgy furthermore, craftsmanship. It was the development of iron and steel and their huge scope use in fan gear that empowered quick development in settled agribusiness. It is an accolade to the Harappan public and the individuals who followed them that the innovations developed by them could keep up with progression during the succeeding centuries and were esteemed as a component of the material culture of individuals (Alam, 2001).

Horticultural mechanization at independence

In 1947, Indian horticulture utilized for the most part customary Fann power sources and fan gear - bullock drawn furrows, wooden stake tooth harrow; wooden board for crushing, compaction and smoothening, bullock trucks and hand devices, for example, khurpi, crowbar, spade, digger, sickles, daratis, hatchet, chopper, dau and so forth Water system water was lifted utilizing enliven sources like swing bin, enterprise lift, Mhote/CharasalSundiya and Pars iron wheel and so on A few givers, worked with by pioneer aces were attempting to present western soil reversal 15 cm long pillars furrow (Meston). The lone mass-produced things were spades, pickaxe, crowbar and watering containers fabricated by Tatas. Customary ranch hardware was made by neighborhood specialists utilizing locally accessible materials without normalization and quality control (Anonymous, 2001). There was a parcel of inconstancy district to the area as uncovered by the study attempted by ICAR in the 1950s. Beginning with the Battle of Plassey in 1757 British East India Company became pilgrim bosses of India by 1857 and the British controlled till fourteenth August 1947 (Anonymous). It was the period during which modern transformation carried success to Europe, America and Japan with settlements as hostage markets and providers of modest crude materials. India through its confident towns kept up with its financial success till archaic periods. The towns were fundamentally makers cum primary processors. Modern unrest and approach of electro-mechanical machines improving and at a lot less expensive rates delivered customary ventures non-serious. Also, an approach of regarding India as the provider of crude material and market of handled great delivered rustic India simply a maker of crude material at the hour of freedom country

individuals utilized conventional stone processors for atta and dal planning. Rice was gotten from hand and foot worked pounds (mortar-pestle) cleaning by wind and cleaning container (Anon). Oil was separated utilizing bullock-drawn Nikolaus. Tribals utilized Petula for oil extraction. These left 15-25% oil with the cake. Metropolitan individuals approached burr mill for atta, huller for rice and expeller for oil extraction. After autonomy, each focal and state government has attempted to restore on-ranch/country agro-handling (Bisht *et al.*, 2001).

Improvement in agricultural mechanization

Endeavors to have further developed ranch hardware began before long autonomy. Nonetheless, green revolution in 1967-68 especially brought to the center the need for rural automation for proficiency in ranch activities and effective use of scant and exorbitant data sources. Initial not many guard harvests delivered conventional post-collect foundation deficient, coming about into extreme reap and postharvest misfortunes. It came about into post-collect innovation as one of the push regions also, another multidisciplinary space of R&D.

Presentation of pumping sets

The green revolution was set off by logical and mechanical sources of info that went with upstream and downstream emotionally supportive networks. Innovative bundle remembered motorization for normal asset improvement, farming field activity, input applications and on-ranch essential handling. After concentrated testing and assessment in the late 1950s water system siphoning sets got into native assembling, the two-thirds motor worked and 33% electric worked. As provincial zap progressed extent has switched. Creature drawn further developed MB furrows, harrows, puddlers, carries out, for example, seed drills, seed-cum-compost drills, 5 hp power harvesters utilizing primer of the siphoning sets, got into assembling and use (Cowx and Ian 1990).

Native manufacture and use of tractors

Focal tractor organization (CTO) set up before long autonomy to recover marshy lands and clean backwoods to settle uprooted individuals set the rhythm of factorization in India. CTO utilized crawler farm haulers; their activity and support were by Indian administrators. After beginning loads of extras ran out, native assembling of basic quick-wearing parts began. For factorization of seedbed readiness, planting and transport and so forth 4-wheel General Purpose farm trucks were imported CKD (totally wrecked), amassed, promoted, worked and adjusted by Indian human assets (Gite and Singh, 1997). The certainty acquired brought about reformist native production. "Swaraj" 35 hp from MIs Punjab Tractors was the first completely native farm vehicle fabricated in quite a while. Looking to the prevalence of little and peripheral homesteads 2-wheel work vehicles famously called power tillers were presented, after the presentation of 4-wheel farm haulers. Nonetheless, power turners couldn't

confront contests with the farm hauler industry furthermore, their utilization didn't grow as quickly as of the farm haulers. Today India is the biggest maker of farm vehicles on the planet with around 2,75,000 farm vehicles each year also, around 15000 every year power turners. China can advertise its force turners in India at less expensive costs, in any case, there are after deals administration issues in numerous cases (Khan, 1990).

Ranch equipment

With the presentation of work vehicles and force turners in India incredibly the advancement, reception and creation of coordinating with hardware for a land evening out, seedbed readiness, cultivating and planting seed-cum-compost drills, sprayers furthermore, dusters, gatherers and force harvesters, 2-haggle wheel farm truck streetcars and so forth began incredibly. Ranch carries out got held for the limited scale enterprises (SSI). It turned out to be cutthroat ranch gear modern action in Punjab and pockets everywhere in the country. Nonetheless, to improve quality numerous things have been merited at this point (Kondo, 1998). Countless further developed homestead hardware have been planned, created, received and great numerous commercialized identifying with land and water asset advancement, water system and waste, seedbed planning in both upland and wetland circumstances; planting, planting and rice relocating, intercultural and weeding, splashing and tidying. Serrated sickles, organic product pluckers, vertical transport harvesters strolling, farm hauler driven and self impelled and joins farm hauler mounted, work vehicle driven and self pushed have been well gotten by the ranchers (Pandey *et al.*, 1997). Custom force sifting has come up incredibly extraordinarily in rice-wheat eco-frameworks. This has put interest for high limit bulk fed power harvesters (up to 1-1.5 Utah grain limit). Force harvesters have been produced for the enormous number of field crops. A considerable lot of them are multi-crop. Joining, for crops it works, is the least expensive choice. Nonetheless, it leaves straw on the ground making its utilization and removal issue. To hold over this issue straw joins have been created. Yet at the same time numerous ranchers, burn the straw to dispose of them. Notwithstanding, plant crop development, animals farming, also, fishery keep on unnecessarily working seriously. It is proposed to address agricultural yield automation during X Plan. For transport of homestead produce, inputs and attractive excess there is a wide scope of customary and further developed vehicles being used. Nonetheless, for different reasons transportation on the head, shoulder and creature back keep on existing. Transport of attractive overflows to business sectors and conveyance focuses uncommonly of perishables like leafy foods and creature items aren't good furthermore, over the top expensive requesting R&D contributions on need creating the moderate cold chain.

Post-harvest equipment

Cycles, handling gear and the board rehearses are crucial

to limit post-gather misfortunes, hold and store perishables to haggle with the powers of advertising and acknowledge due profits through esteem expansion and agro-processing. Manual and force worked shellers, decorticators, dehusked, cleaners and graders have been created and marketed. Through these on-ranch esteem expansion exercises, ranchers can acquire more and hold waste and results of feed, fiber, fuel and compost esteem on the actual ranch. Drying is a very modest and dependable strategy for broadening the timeframe of realistic usability. High dampness food grains, oilseed and other ranch produce endure serious subjective just as quantitative harms. Sun-powered, sun-based cum-rice husk/crop buildup terminated, oil terminated and electric warmed plate, bunch, recirculatory and proceeds with dryers are accessible on the lookout. Notwithstanding crop dyers are not yet famous for on-ranch use requiring serious expansion endeavors.

Capacity

Customers of about 65% of the farming items of food, feed, fuel, or fiber esteem are country individuals who hold oats, beats, oilseeds and so forth if (all things considered about 35%). On-ranch customary stockpiles have selective misfortunes. Improved stockpiles for home and on-ranch stockpiling of food grains prophylactic and corrective rehearses have been created (Farooq *et al.*, 1998). Nonetheless, ranchers think that it's hard to securely store vegetables thus they sell them following harvest when the costs are by and large low enduring monetary misfortunes, a disincentive in beat creation. For certain perishables, in a blistering dry climate, evaporatively cooled stockpiles have been found helpful in expanding the timeframe of realistic usability significantly. Public and private virus stores, CA and MAP stockpiles and onion stockpiles are being used. Deptt. of Agriculture and Collaboration, Govt. of India is advancing virus stores and onion stockpiles through a back finished capital endowment conspire.

On-farm milling and processing

Acknowledging due profits from agrarian produce and buildups on-ranch processing and handling is fundamental for addressing nearby issues cost, effectively handling and using results and waste and marketing the excesses after esteem expansion. Country India used to be maker cum-essential processor be that as it may, during frontier periods essential handling was not energized and innovatively delivered non-cutthroat. There are a few go-betweens between the makers and buyers adding 25-half shopper cost even to provincial shoppers. To empower rustic area to address its issues essentially cost and market esteem added items for extra pay and work measures, gear and pilot plants have been created like smaller than normal rice factories, little dal factories, small oil expellers, smaller than normal grain plants, soy-milk-cum-tofu plants which are industrially accessible. Models of Agro-Processing Centers have been fostered at underlying speculation of Rs. 2-3.5 lakh give full-time work to 2-3 individuals and have profit from

speculation (CI) of 40-100%. It is a linkage that develops with automation in farming giving motivating forces to speculations to build creation and efficiency.

Strategy issues and quality assurance

Rural motorization is a somewhat less controlled area. As a rule, requests are made for "fitting automation" which brings monetary seriousness and eliminates avoidable drudgery (Yadav, 2007). A draft farming motorization strategy has been created by DAC in participation with ICAR. To secure the rancher's interests, GOI has the necessity of testing and affirmation before the presentation of another ranch gear. BIS standards all affirmation is there for quality confirmation which are drawing progressively nearer to ISO. Globalization has put uncommon interest on producers to guarantee quality to stay cutthroat. The National Commission on Women is squeezing R&D associations and advancements to eliminate drudgery, to cultivate ladies. Nearly 17 hand instruments and carries out are under assessment. To save the administrators, eliminating risks, GOI has authorized the Dangerous Machine Regulation Act which is being authorized by the States. BIS has fostered various well-being principles. In food and agro-handling CODEX, what's more, HACCP has gotten significant and is being energized.

Arising trends

Agrarian automation patterns are connected with the patterns in horticulture, agro-preparing and provincial living, globalization of world business sectors and market patterns, WTO commitments and State and Central Government approaches and requests of political constituents. Agribusiness is a State subject. Choices at the state or local level for independence or strategy to focus on abusing agro-natural benefits and meeting shortages through imports from other Conditions of the Union or an unfamiliar source are probably going to influence the automation patterns. As of now, things are in the condition of motion. Modernization requires complexity in motorization which is conceivable at moderately enormous sizes of activities with capital and the executive's imperatives survive. Globalization puts hefty interest on seriousness, the diminished unit cost of creation, by implication requesting motorization and partially mechanization driving to loss of work. These will prompt tractorisation_ Marginal and little ranchers are progressively turning out to be low maintenance, non-attendant ranchers, periurban ranchers, wage workers on part or full-time premises. Industry and administration areas, exchange and business unfit to lessen land-based workforce the rustic individuals to stay ashore based occupation, constraining consistent expansion in the number of land possessions however normal land property going down making motorization more testing and troublesome. Downsizing of homestead machines diminishes mechanical benefits. Rather than claiming ranch hardware other than hand apparatuses such negligible homesteads can address their issues through custom overhauling, on the off chance that it is well created (Singh *et al.*, 1997).

The nation is confronted with the fundamental work issue of the rustic masses. With per caput arable land accessibility diminishing and normal land holding coming down to levels that it is excessively hard for the ranch families to have the least satisfactory principles of food, cover, clothing, medical services and training, the Focal and State Governments are seized with the issue of approaches to augment job base of these individuals. Expanding efficiency; crop broadening towards cultivation, domesticated animals farming, fishery and ranger service; post-reap the board for minimization of post reap misfortunes, esteem expansion and agro-processing for extra pay and business are a portion of the formative estimates articulated and related plans and projects dispatched (Shin-Norinsha, 1998; Singh, 1997).

DAC, Government of India have dispatched Agri-center and Agri-business Plan that will enhance and substitute a portion of the expansion capacities and administrations delivered by the public area augmentation. It is visualized that business visionaries will offer custom support to the ranchers other than other administrations which will require machines of huge limit. The business visionaries will be additionally taking agro-handling, bundling, transport and showcasing exercises both for homegrown and unfamiliar business sectors. Governments are additionally reassuring agreement cultivating for example ranchers delivering determined agrarian produce required as crude material for enterprises. Governments are additionally lessening go-betweens among producers and buyers. Developing working classes where both a couple is working need handled and semi-prepared prepared to cook, prepared to eat things. Under such a complex 'situation the arising patterns in motorization of farming, agro-handling and country living are as per the following (Singh and Chandra, 2000).

Ranch power units

1) Vivify energy, both human and draft creatures (DAP) will keep on being significant wellsprings of fan power extraordinarily on little and peripheral fans, slope agribusiness, agricultural yield development, creature cultivation and fishery. In any case, utilization of DAP is probably going to keep up with its declining pattern and may settle around 20-25 M pair of bullock same. Because of the absence of openings in different areas of the Indian economy, utilization of humans as ranch laborers is probably going to develop yet at a lethargic rate with components of under-business.

2) There will be expanding interest in riding-type ranch hardware. Creature-drawn apparatus transporters under various brand names will get in use whenever refined. Moreover riding type power turner Fann tasks will be in request. Some force almost certainly is lost in the transport of the administrator and the apparatus transporter, yet the deficit is more than made up through acquire in net functional time because of the good work-rest cycle in a riding type man-machine framework. Drudgery to the administrator is limited.

- 3) Research and development in burdens and bridles, draft capacity examines will make more powerful DAP use frameworks, utilization of inconsistent creatures, DAP of two various species are probably going to come up.
- 4) Little motors (1-3 hp) for handheld and backpack power worked hardware for pruning/cleaving, support managing, cutting of brambles, tree felling, tea collecting, showering, cleaning and so forth are probably going to turn into mainstream.
- 5) Because of worldwide rivalry rural motors-diesel, petroleum, lamp fuel, biofuel will be better through predominant metallurgy and fabricating measures. Advances in ignition chamber plans, fuel infusion and so on will make them more eco-friendly. Clamor and vibration issues will get more prominent consideration.
- 6) Scarcity of oil holds will bring biofuels-liquor from sugarcane, molasses, corn cob and so on and non-palatable esterified vegetable oils for use as biodiesel.
- 7) For fixed shaft power tasks, electrical force age and measure heat for agro-handling substitute fuel sources like maker gas from crop buildups, fan and side of the road developed energy ranches, handling squanders like rice husk, groundnut shell and so on will discover more prominent acknowledgment. Sun-oriented thermal systems and thermal power units run on crop and agro-handling deposits are probably going to acquire prevalence as stand-alone force units.
- 8) Lightweight and particular PT for slope horticulture/terraced cultivating are going to seem to utilize diesel and biofuels.
- 9) Normal fan's power accessibility will go up from the current 1.15 KW/ha to 2 KW/ha for wanted power of trimming and to guarantee practicality.

Homestead implements and machines

- 1) Further developed energy productive coordinating with carries out and machines for distinctive unit tasks of agribusiness are required to be accessible soon.
- 2) For idealness, viability and decreased unit cost of activities single-run machines will acquire acknowledgment.
- 3) Fast ground hardware for culturing, planting and planting utilizing rolling, rotational and vibratory activities will be presented in the future.
- 4) Custom recruiting in seedbed planning, planting, planting, relocating, collecting and sifting and other specific unit tasks where responsibility for expensive gear isn't supported will be much popular.
- 5) Microchip-controlled hardware for land evaluating, cultivating, relocating and ranch hardware the executives.
- 6) Exchange utilized homestead apparatus, fix, reconditioning is probably going to come up to lessen capital necessities of cultivating.
- 7) General improvement like ranch hardware is probably going to be accomplished constrained by worldwide contest, send out possibilities through Research and development, normalization and quality control gauges and progressed fabricating techniques.
- 8) Utilization of plastics in ranch apparatus produce extraordinarily for containers, handle holds, conductors and tubings, metering gadgets, surface covering and parts requiring flexibility or consumption opposition and so on Advances in polymer science and accuracy in infusion moldings would turn out to be able to out less expensive spouts and control valves, gear drives.
- 9) Parts and entire hardware planned with ergonomic thoroughness adjusting to anthropometry of laborers and worked on experimentally set up work-rest cycles will be there. Working stances are prone to change from twisted and sitting to raise stances for a more prominent work yield and less strain on the body.
- 10) Customary culturing and planting will be enhanced and subbed by rotating culturing, protection culturing, raised-bed frameworks for the economy, adequacy and improved efficiency.
- 11) Traditional Biasi, Lehi and physically relocated rice will be enhanced and subbed by mechanical relocated rice utilizing physically worked and self impelled transplanters and mat sort nursery. Dry boring and paddy planted with pregerminated paddy seeder in evened out the puddled field (Lehi substitute) have effectively made in-streets. Registration relocated and bidirectional precisely weeded paddy crop has yield benefits and accordingly prone to make progress given moderate registration grower and productive weeders are created and made accessible.
- 12) Zero-till drill and brought bed grower up in rice-wheat environment are going to become even more mainstream for the economy being used of water system water (35-half saving), decrease in the unit cost of creation (1500-2000 Rs/ha), better control on phalaris minor and yield benefits (about 5%).
- 13) Mechanical weeders - manual, the creature has drawn, power turner and farm hauler mounted and self-moved force weeders for wide column just as rice-wheat will be in more noteworthy use and would be accessible in wide reach.
- 14) Sugarcane grower; shaper grower which makes sets, plants, applies compost, weedicide and pesticide in one go will acquire popularity.
- 15) Sugarcane stubble shaver and ratoon the board gear are going to be popular.
- 16) Drills and growers for directly cultivated vegetables, vegetable transplanters for pruning and soil block develop seedlings of brinjal, chilies, cole crops, onion, garlic and so forth are required to be being used as vegetable development gets popularized.
- 17) Polyhouse nursery-regular, pruned and soil block just as self-loader nursery will come up.
- 18) Compressed water system frameworks-sprinklers, miniature sprinklers trickles, fertigation, skip a row, water system for water protection and upgrade of water use proficiency and related yield benefits. On-ranch farming waste-surface, sub-surface and vertical will be an indispensable piece of on-ranch water the board. Waste not just improves usefulness yet additionally impacts such

factors as housing of the harvest along with seed rate and N-application. Automation in laying seepage framework will acquire grounds.

19) Wide blast and strategic position freedom sprayers, tall tree sprayers and dusters, turbofan power sprayers and dusters/aeroblast sprayers and dusters will come in more prominent use. Climate contamination related to splashing and cleaning and pressing factor being mounted by earthy people is liable to lead to utilization of electrostatic showering and cleaning which has better impingement and almost no float.

20) Sickle reaping of cereals, extraordinarily rice, wheat and so forth is being subbed by harvesting with vertical conveyor collectors-strolling, riding and PT and farm vehicle-mounted. This gear will be in more prominent interest.

21) Force sifting is as of now stylish for the majority of the yields through claimed or on the other hand exclusively recruited power harvesters. The pattern is arising for huge limit, mass took care of, multi-crop harvesters. There will be power harvesters for hard-to-shift crops like pigeon pea.

22) Use of standard grain consolidates for the enormous number of oats, beats and oilseeds are as of now there developing @ more than 10% yearly. Requests for grain joins, plot consolidates will rise.

23) Gatherers for business crops like sugarcane, cotton will be there is not very far off future. Scrounge gatherers and scavenge consolidates and roughage-making hardware will be popular.

24) Agri-gadgets has arisen as a space for R&D and going to make accessible various tough, easy to understand, reasonable electronic contraptions to rehearse exactness cultivating like pH meter, water quality analyzer, large scale what's more, miniature supplement analyzers, machine vision for plant development the executives, analyzers for assurance of nature of produce electronic ultrasonic bug repellers, electronic bird scarers and so forth are a portion of the potential outcomes. Advanced mechanics in foods grown from the ground collecting have effectively been field tried in the created world where work is extravagant. Programmed water system frameworks are being used effectively in India at the pilot level.

25) The natural cultivating acquiring force will have further developed hardware for the fuse of biomass in the dirt, FYM and fertilizer spreaders. Slurry siphon, big hauler and slurry implements are likewise going to be sought after to reuse strong and fluid misuse of domesticated animals. Motorized treating the soil has now better odds of acknowledgment. (Tiwari *et al.*, 1997).

Agro-processing

1) On-ranch produces the board will get more noteworthy regard for limit gather and post reap misfortunes from subjective and quantitative harms. This involves reaping at the right time, utilizing the right gathering apparatuses, carrying out machines, treatment of the product in a way that mechanical, climate and physiological harms are limited exceptions in products of the soil.

2) On-ranch esteem option for extra pay and business and simplicity of showcasing and holding preparing and processing side-effects of feed and fuel esteem on the actual homestead simultaneously saving in dealing with, transport, capacity, bundling costs and so forth. This will put dehusked, shellers and decorticators, cleaners and graders in more prominent use. There will be mechanical washers and products of the soil bundling lines.

3) Agro-handling to address nearby issues of rice, atta, dal, oil, ground flavors, products of the soil and domesticated animals feed, concentrates utilizing smaller than normal grain factories, little modern rice plants, small expellers and bunch dissolvable extraction units, hammer factories, blenders, stowing and sewing units and so on are going to be there underway catchments.

4) Metropolitan working classes are searching for prepared to cook even prepared to eat things. This is probably going to offer the spot to soy-milk and tofu plants both in provincial what's more, metropolitan regions. Negligibly prepared vegetables and natural product juice concentrate, jam, jams, confections and so on can be delivered underway catchments and provided straightforwardly to retailers at much lower purchaser costs. Such handling units will come up. 5) Logical capacity staying away from trouble deal and giving slow time of year supply is a worth expansion action. Stockrooms, storehouse stockpiles, stockpiling in evaporative cool chambers, cold stockpiling, onion stockpiles have great possibilities and are liable to come up incredibly.

6) Drying is a deep-rooted technique for the conservation of horticultural produce and to have a long period of usability food items from perishables, generally sundried. Warmed air dryers-cluster type, clump in-receptacle, recirculatory and constant type are there for food grains and such particulate materials, a portion of these are being used at mill operators level as of now. On-ranch mechanical drying is probably going to come up to save damp grains from discoloration and microbial harm. Plate dryers are broadly utilized for drying leafy foods cuts. For on-ranch drying of leafy foods, sun-powered plate dryers have been created and are acquiring acknowledgment. Osmodehydrated organic product cuts are exceptionally engaging and organoleptically evaluated high. Scraped surface dehydrators are probably going to come to gather milk into khoa and other such, applications.

7) Agro-processing centers suitable for various creation catchments utilizing current handling gear coordinating to the sizes of activity will come up empowering makers addressing their necessities at the most minimal expense simultaneously market overflows after esteem expansion.

8) To deal with, capacity, transport and market perishables cold chains are required. Accessible ones are excessively costly. Native cold chains are going to be there for various products. In a manner, it exists for milk, fish, meat and so forth Notwithstanding, more noteworthy advancement and imagination are normal in this region.

9) Cycles and pilot plants are normal delivering forte eating routine food sources like soy-milk, tofu, soy-braced rolls, soy-yogurt, soy-frozen yogurts, tempeh burgers and so forth. Cycles and pilot plants will come up for powder and fluid jaggery, drinks from sugarcane and conventional natural products.

10) Molecule board and wood substitutes made out of jute and kenaf sticks, paper and mash from jute cuttings, sticks and entire plant; create paper and folded board bundling boxes out of cotton stalks are illustrated effectively more business units are probably going to arise.

11) Little jute turning framework created at NIRJAFr on the example of khadi making utility items from jute fiber and their mixes holds guarantee.

12) Cotton ginning and baling are being modernized under technology mission on cotton which will set up high proficiency roller gins, sawgins, pre-cleaners, electrically controlled balers and mechanical taking care of frameworks in modernized ginneries which should cotton exchange and material industry.

13) Cycles and pilot plants will come creating seedlac, shellac, faded lac, lac wax, paints and stains, palatable grade lac color, significant synthetic compounds from lac and its side effects.

14) Jute and material industry will encounter more noteworthy modernization what's more, robotization.

15) Jute and kenaf ribbons and decorticators to empower lace retting for quality fiber and limit contamination are going to come being used.

16) For productivity and manageability of business crops push on broadened utilizes is probably going to keep requesting advancement of new cycles and hardware to understand the possibilities (Singh and Chandra, 2000).

Rustic living

1) In a town eco-framework, 80% of the all-out energy spent goes to the homegrown area and of that 80% goes for cooking. Bringing of drinking water, the assortment of fuelwood are cordial to provincial ladies and youngsters. Rustic kitchens are loaded with smoke, not well enlightened, the reason for some wellbeing risks. Nature of fuel chooses personal satisfaction to a housewife, provincial or metropolitan the same. In that situation, biogas ovens, pyrolyzed briquette fuel and sigdi, biogas light, biogas run stoves; sunlight based cookers-individual and local area type, sun-powered water warmers are under advancement and are probably going to increment in number enhancing and subbing customary cooking and water warming.

2) With the rustic jolt in India, fridges are coming to country homes which give the ability to store perishables securely and forestall wastage.

3) Pressing factor cookers which are energy products are likewise arriving at provincial homes.

4) Other kitchen apparatuses like blender processors, electric iron, electric fans furthermore, lights are being utilized in energized towns.

5) Butane supply to provincial regions is progressively spreading which is going to monitor fuelwood and other biomass for natural reusing.

6) Smokeless cooking ovens that are energy effective subsequently, are under advancement effectively amazingly.

7) Hapur kothis, metallic impermeable stockpiling containers have discovered acknowledgment that guards the food grains shielded from rodents and empower fumigation in the occasion of pervasion.

8) Ata challis is doing custom processing moreover mechanized wet processors have become well-known lessening drudgery in-country Horne. Single-stage electric engine run cleaning evaluating and size decrease hardware moreover open roads of custom overhauling to other.

9) Rustic water supply and disinfection and provincial streets and public vehicle are slowly developing. Dry and wet sort drill opening latrines give modest disinfection to country homes.

10) Biogas plants, fertilizing the soil, vermi-treating the soil permit provincial individuals to convert natural squanders into abundance removing energy and plant supplements in a litter-free, fly-free, burning-free way.

11) Country agro-preparing focuses and other home level agro-handling and create exercises utilizing scaled-down burr factory, sun-based dryers and so forth are empowering extra pay and work in spare time (Tiwari *et al.*, 2001).

Status of agricultural mechanization database

Frail Fann Mechanization Database.

- Draft creature power time-series information.
- Unreliable information on fan hardware industry exceptionally little and cabin area level.
- Fann hardware number and topographical conveyance.
- Precise utilization of quicken and business energy (restricted information from AICRP-ERAS).
- No dependable information on request of fan gear.

Conceivable strategy

- 1) Specialized Committee on Farm Mechanization On-fan Agro-preparing to embrace exceptional reviews.
- 2) More profound association of INARIS with farming automation.
- 3) Agrarian Statisticians ought to incorporate horticultural automation, agro-processing also, rustic living as one of the spaces of action.
- 4) Supported activities on these angles.

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