	decomposed manure, application		bacteria produce sulphate, directly taken by plants for building body tissues and promoting growth.
2	Ploughing	5	Ploughing creates aeration that convenes aerobic decomposition
3	Formation of raised bed furrow system	10	RBC increase soil depth to larger volume of moisture and air in the root zone. The additional moisture and aeration makes plant growth under both the condition of water logging and drought. This situation permits crop diversification in the low lands where only paddy cultivation is possible.
4	Precision sowing	5	The precision sowing enable harness yields from entire space of the field under crop. Both raised bed and furrow can be sown/planted to extract utility high and low moisture and the oxygen supply.
5	Maintenance of optimum plant density	10	Plant density that will be produced by the crop variety and crop should be optimised by generation II (2G) research.
6	Sprinkler irrigation at optimum efficiency	10	Sprinkler irrigation freshens irrigation water by eliminating hydrogen sulphide and methane like harmful gases in water, thus create adequate oxygen supply and save irrigation water
7	Weeding	5	Weeds removal is removal of nutrient and moisture by unwanted plants that may grow in the crop field
8	Inter culture	10	The inter-culture again enhances aeration during the crop growing in the field.
9	Subsequent cropping system	5	Subsequent cropping utilises land which emits GHGs contained in soil (at least 10% of total yearly GHGs emission. The subsequent cropping enables function of nutrient cycle under aerobic condition and supplement the soil to be harnessed by the paddy crop.
	Composite enhancement additive index	75	Combined additive effect of all factors enumerated above.
	Multiplicative index	2.047	Combined multiplicative effect of above all factors.

3. Results

The present study identified total 17 quality characters for constitution of designer rice as against only genetically induced quality characters in the past. The quality characters of rice can be broadly categorised in three groups viz that induced by the genetically improved expressed in to variety, other induced by the improvisation and the third one some technology induced qualities. The emphasis on the variety has been going on since the development of culture and related knowledge of selection and plant breeding. This fact of dominance of genetic efforts and endeavours that exists in varietal development for enhancing protein, vitamins and also some minerals is sufficiently established by the subject dealt with in book[21]. However, the quality of rice produced from the same varieties grown at different locations with change in agro-climate, soil and

cultivation technique get remodified. Processing engineering has also been playing important role in bringing milling and polishing and cooking expertise in quality consumption of rice. The effect of genetic, improvisation and other technology on the quality character of rice are considered in the following.

3.1 Genetic quality character of rice

The quality characters (**Table 9**) viz grain size, fragrance, high protein content, high vitamin content, easy milling, quality milling, multiple use of by-product, high harvest index, drought resistance and crop duration are total 10 aspects where genetic has played important role in development of quality of rice. These characters are also affected by the soil, climate and improvisation managements that are given in production of rice. These quality considerations have been attempted at local and international levels. All regions have some special varieties that produced different quality characters when grown at different locations. Thus, ocean size developments of genetic engineering have been going on and each white spots glitter like the fireflies. These firefly lights get over shadowed by the emergence of new stronger light by another firefly. In absence of any other universally improvisation technology, the genetic improved quality has prevailed as the quality of rice. Other technologies get overshadowed by the genetic improved quality of rice, in general.

Table 9. Role of different scientific facts in designer rice production

S.N.	Quality	Contribution	Effect of contributing field	Composite out come
1	Grain size	Variety breeding	Genetic effect	Fine long grain rice
		Imrovisation	-	
2	Fragrance	Mutation breeding	Genetic engineering	Smelling variety
		Improvisation saved fragrance	Aerobic condition	
3	Good taste	Good improvisation	Improvisation management	Tasteful food
		Expert cooking	Expert preparation	
4	High quality protein content	Genetic Engineering	Genetic engineering	Thiamine and lysine content and good energy source
		Imrovisation to produce sulpho amino acid	Imrovisation engineering	
5	High Vitamin content of B1, B2	Genetic engineering	Genetic engineering	High vitamin rice
		-	-	
6	Free from undesirable toxic salt contents	-	-	Toxic salt free rice
		Improvisation	Reducing bioavailability of toxic salts	
7	No bad smell	Genetic	-	Danger free food
		Aerobic decomposition elimintes H_2S and SO_2 production	Eliminate smell producing gases	
8	Easy milling	Genetic	Soft dehusking	Easily milling rice
		Improvisation of irrigation and nutrients	Soft cover development	

9	Quality milling quality	Genetic Engg	Homogenous maturing rice	Whole kernal milled rice
		Rice should not excessively break	Processing for milling	
10	Multiple use	Genetic	-	Food products such as beaten, fried, parboiled, flour etc.
		Rice useable for multiple uses for foods	Processing ability to produce different items of foods	
11	Multiple use of by products	Genetic engg	Genetic	Extra source of income for the rice growers
		By products of rice such as straw, husk, brawn	Improvisation engineering	
12	High harvest index	Genetic improvement	Genetic engineering	Increased harvest index
		Improvisation engineering	Enhancing uptake of P and K	
13	Low water demanding	Genetic	Drought tolerant variety	Stabilised yield
		Variety less sensitive to water shortages	Adopt racy nature agriculture	
14	Low external input requiring	Reduce cost and allow resources use	Racy nature agriculture enables all necessary requirements	Good production with indigenously available resources
15	No emission of GHGs	Convene aerobic condition to revolve C,N,O, P and S cycle	Racy nature agriculture technology	No release of GHGs
16	Climatic resilient	Produce good yield under all climatic situations.	Racy nature agriculture technology	Stable yield productivity
17	Acceptable crop duration	Genetic improvement	Genetically short duration variety	Yearly high food production Possible
		Standard duration to permit other crops cultivation	Adopt racy nature agriculture	
-	Overall	Genetic	10/17 (59%)	100 % designer rice
		Improvisation	15/17 (88%)	
		Other	4/17 (24%)	

3.2 Quality enhancing improvisation management

The quality characters of rice which get affected by improvisations are fragrance, good tastes, protein content, vitamin content, free from undesirable salts, free from bad odours, easy milling, multiple use, multiple use of by-products, free from external inputs, restricted emission of GHGs, high harvest index, low water demands, climatic resilience and crop growing duration *ie* total 15 aspects(**Table 9**). Earlier effects on quality improvements were not visualised at global scale. The effects of improvisation were limited at the local scale

like the glittering of fireflies, again. There has been general lack of universal designer rice. This study has established role of land, water, nutrient and management practice of universal application of racy technology[1],[16],[17],[18],[19],[20]. The incorporation of working of sulphur cycle makes it easy to bring much quality improvement of rice. Since it is improvisation practice of universal application the quality will also be unique across the globe. There will be scope to launch a global competitive challenge for production of the world class designer quality rice to give accomplishment award. The land and water management situation will receive good attention in production of quality of rice. The application of efforts will indicate the weakness of quality factors, where research efforts need to be specially fortified to bring quality production of world class rice everywhere. The land, water degradation, scarcity of resources, enhancement in productivity and protection of environment with respect to emission of GHGs such as methane and nitrous oxide will get suppressed. Thus, environmental menace of rice production will get eliminated that result from extensive and intensive rice production.

3.3 Quality of rice enhancement by other input practices

The processing engineering, particularly milling and parboiling are considered as processing engineering contribution of quality of rice. Polishing of rice eliminates the vitamin contents of rice which is predominantly desired quality content from the whole grains. In rice keeping the rice unpolished will bring the quality by unprocessed rice. Earlier less emphasis on nutritional quality was overshadowed by the appearance and the polishing removed the vitamin contents. The quality of by- products such as husk, extraction of edible oils for food and alternate industrial uses, cattle feeds, paddy straw for cattle feed, preparation of aerobically decomposed organic manures will make rice cultivation inclined towards industrial applications. In the array of 17 quality characters (**Table 9**) other factors include expert cooking to produce good taste, quality improving processing and multiple uses by cooking *i.e.* four quality aspects.

The improvisation technology, the racy nature agriculture has several inbuilt components which contribute to improve quality of rice being new development, by the author, is referred to here to make the quality aspects other than the variety *i.e.* by improvisation are presented to let the researchers and rice growers comprehend the issues how these are going to bring improvement in the designer quality of rice.

3.4 Classification of quality characters

The quality characters are classified in two separate groups of variable and attribute (**Table 10**). The variables can be measured in some unit of measurement and scales. The other qualities are which can be felt but cannot be measured in terms of units and set scales. Such qualities are called attributes. The attributes can be rated by general theory of acceptance on individual consideration. This method, known as Delphi method[55] is well accepted way of measurement and applied in different evaluations, that cannot be assigned unit of measurement or in monetary terms. The quality variables and attributes play important role in rating of quality of rice. The Delphi method is based on progressive assessment of individual considerations[26].

Table 10. Classes of quality characters of designer rice

S.N,	Variable	Units	S.N.	Attribute	Assigned score
1	Grain size	mm	1	Fragrance	100
2	High Protein	range	2	Good taste	100
3	High Vitamin	Range	3	No bad smell	100
4	High harvest index	percent	4	Easy milling quality	100
5	Easy milling	Range			
6	Good milling quality	lowPower			

7	Multiple use of rice	no			
8	Multiple use of byproducts	number			
9	Low water demand	cm			
10	Low external input requirement	number			
11	Low GHGs Emission	units			
12	Climatic resilience	percent			
13	Acceptable crop duration	days			

*Delphi Method

3.5 The racy nature agriculture

A knowledge intensive green technology for the time sequence and convergence based new alive, smart and enthusiastic (racy) named as, Racy Nature Agriculture was innovated to alleviate the drudgery of the adverse factors in present day agriculture and convene sustainable global food security and protect environment (**Fig1a,b**.)

- **he basic module**

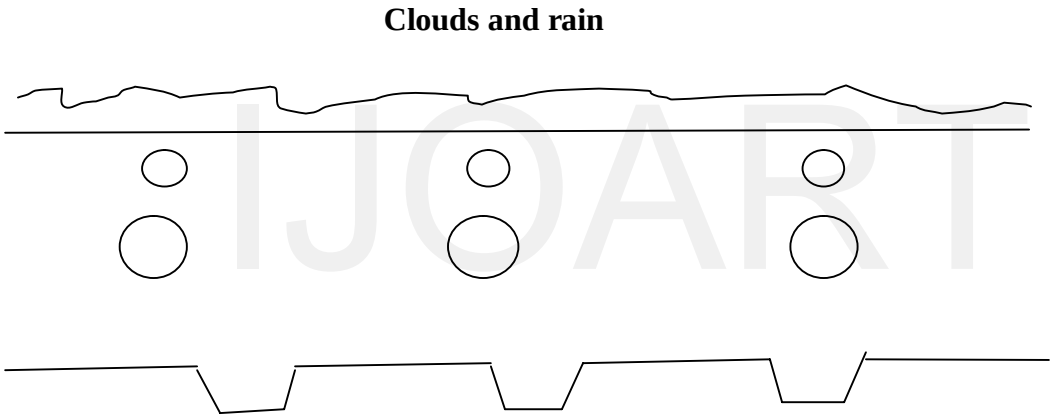

Figure-1a : Land formation of raised bed and furrow for Racy Nature Agriculture under rainfed situation.

[The raised bed- furrow land form supplements adequate oxygen diffusion in the root zone, increased moisture and nutrient reserve for plants under water logged as well as dry condition. Its local customization is to be researched upon.]

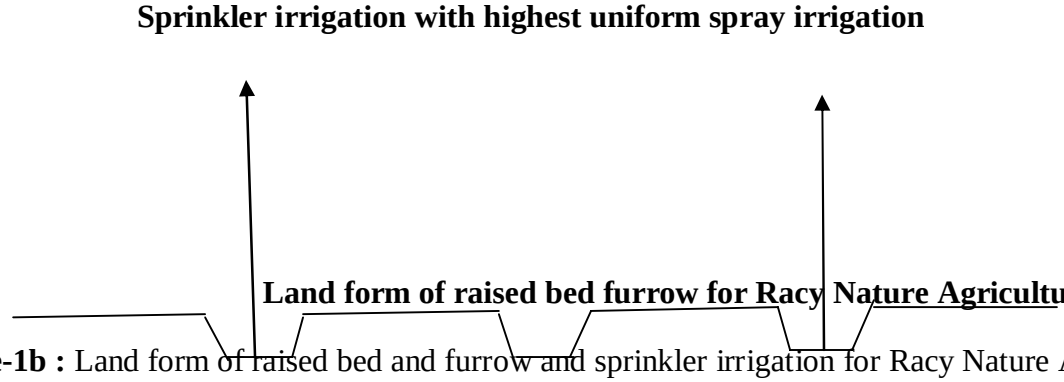

Figure-1b : Land form of raised bed and furrow and sprinkler irrigation for Racy Nature Agriculture

[The sprinkler spray application of irrigation water will increase oxygen content; it will supplement the raised bed enhanced storage of nutrients and moisture and sufficiently aerated, occasionally saturated and drain off the excess water to keep always convene aerobic decomposition of organic and cellulose. This will supplement plant nutrient by way of enabling sulphur cycle to function. This situation brings good water and air interaction].

The racy nature agriculture comprises best results creating soil habitat, nutrient supplementation and conductance of oxygen, moisture, protection from water logging and keeping condition for aerobic decompositions. All these supplementary conditions are necessary for functioning of nitrogen, phosphorus, potash and sulphur cycles to follow beneficial paths to produce nitrate, phosphate, potash and sulphate under all changing hydrologic conditions. In the development of racy nature agriculture band of best practices supported by the scientific facts were synthesized to form the panacea green technology capsule prescriptive for ameliorating agriculture and environment. The technology comprises raised bed and furrow[30],[31],[32] and nutrient supplementation of 25% of N requirement of crop by organic N sources [33],[34],[35],[36],[37],[38],[39],[40],[41],[42],[43],[44],[45],[46] such aerobically decomposed compost or aerobically decomposed green manure or liquid green manure [new formations] [1] precision planting, sprinkler irrigation creating condition of green water as rain [47],[48],[49],[50],[51], supplemented with furrow irrigation of high water demand at jointing, heading and flowering stages of crops, good drainage during flood and long duration rainfalls[19] , weeding, intercultural, harvesting and post harvesting practices to reduce the emission of green house gases', when land is free of crops. It adopts crops selection that builds nutrient reserve which can be synergically utilised in relay race like situation[1]. It promotes productivity with existing situation and conserves resources for posterity. It is a panacea technology suitable for all agro-eco regions, climates, soils, crops and water shortage and poor quality conditions. For example, the racy nature agriculture is applicable even for cactus, a desert nonconventional fruit cultivated in Yemen in Gulf to the other extreme of wettest environment experiencing highest rainfall for paddy crop at *Cherrapunji*, India. It is also equally applicable for controlled environment agriculture such as green houses and poly houses. The technology has capacity to endure adverse impacts of droughts and floods that are likely to become severe due to global warming and climate change in future. The racy nature agriculture focuses and meets world over challenge in the use of natural and fixed resources for agriculture and environment conservation, which have not been found in the existing scientific ventures, except situations of bright spots[14] .The technology surpasses by bringing improvement for covering all agriculture domains, instead of that get produced in isolated and short lived bright spots [14].

The technology capsule components have been validated[17] for their efficient working. The scientific publications and presentations on the related science and engineering of racy nature agriculture technology capsule have been documented [16],[17],[18],[19].

- **Yields**
- **The cropping pattern**

The innovative development of scientific fact is applicable to decide the cropping patterns that make best use of nutrient built by the previous crop. This aspect has been the existing practice of crop rotation. This aspect is very well exemplified by studies of nitrogen management in wheat [22]. Wheat after leguminous crop of guar saved nitrogen doe of 40 kg/ha. It is, further, displayed by the case study presented in T**able 11.** The cropping pattern of rice-onion-cow pea enable functioning of sulphur cycle after rice that supplements sulphate which is utilised by cultivation of sulphur loving crop of onion[29]. The leguminous crop of cow pea extracts nutrient

from the deeper layer after the shallow soil layer utilising crop of onion. The cow pea fixes nitrogen which is used by the following crop of paddy. This crop promotes functioning of nitrogen cycle in the cropping pattern consisting paddy. The nitrogen is essential for building up of essential amino acid and vitamin. These studies have produced example of way of use of cropping pattern in enhancing the productivity. However, there was no consideration of reduction of the GHGs. The cropping pattern charters condition of Aerobic cycle that maintains functioning of sulphur cycle and nitrogen cycle and eliminates build-up of nitrous oxide and methane during the summer months. In the rice growing areas of India, Bangladesh and many south east Asian countries growing of Boro rice is prevalent practice of growing rice during summer winter and summer that carry out GHGs emission year round. This practice bothers the environment conservationists. There is sufficient justification to stop cultivation of Boro rice and grow wheat and pulses as established by the cropping pattern (**Table** 11). The benefits will occur in soil quality, water saving, carbon sequestration and water recycle and water and nutrient use efficiency. Cultivation of maize and wheat as a result of crop diversification will enhance uptake of iron by the aerobic condition instead of iron sulphide that will enhance quality of cereal crops.

Table 11 Rice based cropping system attributes and productivity that supports functioning of sulphur cycle (**Acharya et al,2008**).

Treatments	**Yield of rice, Tones/ha**	**Rice equivalent yield, Tones/ha**		**System productivity, Tones/ha**	**Prod efficiency, kg REY/ha/d**
Cropping Sequence		**Winter**	**Summer**		
C1 (Rice-Potato-sesame)	4.2	21.5	2.7	28.4	97.5
C2(Rice-rapeseed-groundnut)	4.3	4.9	7.6	16.8	52.8
C3(Rice-Cabbage-Green gram)	4.4	22.8	3.2	30.4	105.6
C4 (Rice-Onion. Cowpea)	4.4	26.7	9.3	40.4	126.5
CD (P=0.05)	0.069	4.132	3.342	7.608	20.82

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- **Yearly cropping sequence yield based REY**

The uniqueness of the technology is further exemplified by presenting the data on yield increase of annual crops cultivated in different situations and put in different cropping sequences. The composite rice equivalent yield (REY) in different cropping sequences were accounted (**Table 12**) for assessing the potential production of foods. In the table addition of third crop, quite prevalent under intensive agriculture to increase nitrogen fixation will further enhance the REY. Nevertheless, this component is not included in the data of REY for the sake of keeping the margins of variations at different locations as compensating component for the racy nature agriculture to surpass production everywhere. These values guide one as to which cropping sequence should be followed in a given situation. This will help decide customized management of nature agriculture. The outcome will be better efficient use of resources in agriculture viz increase in food production, conservation of water and

reduction of land degradation on various accounts, viz water, wind, chemical, nutrients etc. The REYs will create new niche in food production. The application of technology makes it possible to use any successful cropping sequence under the limited water supply situation. The limitation of water availability will increase in the years to come because of global warming and climate change and increase in water demand for diverse uses. Thus, racy nature agriculture will be the only stake for future sustainable food security. The customized data will guide governance to be promoted in different agro-eco regions. Likewise, the quality of the food produced in racy nature agriculture will get identified for geographical indication registry (GIr) and Quality patenting. This will help consumers select most genuine and desirable food for purchase and the produces get remunerative price. This situation will enhance the GDP in agriculture and make agriculture more alive, smart and enthusiastic. The primary productivity will give base for industrialization in agriculture and increase in employment opportunities.

Table-12. Yearly cropping sequences and rice equivalent yields (REYs)[7]

Items	**Crops**		**Total, q/ha**
Crops	**Rainy season**	**Winter season**	
Cropping sequence Rice—wheat			
Crops	Rice	Wheat	
Yields Q/ha	114	76	
REY	114	57	171
Cropping sequence Maize –wheat			
Crops	Maize	Wheat	
Yields, q/ha	91	76	
REY	57	57	114
Cropping sequence Maize- Mustard			
Crops	Maize	Mustard	
Yields, q/ha	91	36	
REY	57	74	131
Cropping sequence Soybean –wheat			
Crops	Soybean	Wheat	
Yield, q/ha	50	76	
REY	63	57	120
Cropping sequence Maize- gram			
Crops	Maize	Gram	
Yields, q/ha	91	46	
REY	57	115	172

Price of commodity, Rs/q: Wheat 1200; Rice 1600; Maize 1000; Mustard 3300; Soybean 2000; Gram 4000

- **The technology capability**

Validations of component practices and the composite technology fulfil the validation need of composite technology capsule of nature agriculture[17],[56]. Thus, the technology surpasses and overtakes all known and existing researches and developments in agriculture, food production and environment protection. The racy nature agriculture fulfils and accomplishes challenges related to global agriculture, food, environment and people. It has accomplished more than one and half dozen challenges of natural resources management (NRM).

The technology produces ecological benefits of improvement in soil quality (SQ), water productivity (WP), low external input (LEI), integrated pest management (IPM), water cycling (WC), biodiversity (BD), carbon sequestration (CS) and social capital (SC), more than those known for the bright spots. It is technology of field level application in entire arable area of any watershed to cover any ecosystem accompanying agriculture component in it. The technology will usher global revolution in land and water resources use for bringing food security. Local optimisations of the technology will take care of customization accuracy to account for existing roles of agro-eco-regions, man-machine and socio-economic status. The alteration of decomposition process, arrest of GHGs and heavy metals will reduce GHGs load in atmosphere, reduce load of heavy metals that will reduce global warming and avert climate change. This aspect, totally new application in agriculture will produce food better than so called organic food. Thus, in lieu of some high profile and resources full having access to limited organic food, a better quality and accessible to all surpassed solution is developed. Further, scope for refinements for the third generation research is opened so as to bring technology refinement, in future as well. The lag in the situation and makeup in the shortfall in present day agriculture can be made by recognition of motivational oriental saying i.e. late is better than never. Therefore, it requires to makeup mind, without further delay and come in action for implementation of the racy nature agriculture. The implementation will revamp all to join in mission to create mansion of global sustainable food sufficiency for present and posterity.

3.6 Developments in nutritional quality

As a sample, the quality constituents of export quality basmati rice (**Table 13)** are included to appraise of the constituent qualities of rice. This quality of rice is of the commercial grade product, had been produced in their own way, but not by applying the new technology of racy nature agriculture. The quality of rice produced by the technology constituted in the present study will be better than that of the commercial grade rice. Further the commercial grade rice contains only eight genetically enhanced rice qualities. In the present study the designer rice target comprises 17 quality characters, which promote export, marketing and sale, enhancement of ecosystem services, enhancement in productivity and protection of environment. Thus, it is clear that there exists vast scope for improvement and promotion of international business.

Table 13. Quality content of typical exported basmati rice vis a vis ideally required

S.N.	Quality character	Unit	Content/100g	Scope and measures to enhance it
1	Protein	mg	9	Sulpho amino acid by enhancing RNH3 uptake by crop
2	Carbohydrate	mg	77	By enhancing crop productivity
3	Energy	cal	375	
4	Calcium	mg	6	By adding leguminous crop in the cropping pattern, Some innovative addition can be explored.
5	Phosphorus	mg	50	
6	Iron	mg	2	Folic acid external
7	Fiber	mg	5	External
8	Fat	G	0.5	External
10	Vitamin A	-	-	Vitamin A can be supplemented by adding carrotduring cooking

3.7.Reduction in GHGS emission

In addition to the increase in yield, the green house gas emission of carbon dioxide and methane will be minimum that will protect environment [1],[17],[23],[57],[58],[59]. It supplements the statements that think global and act local. It is evident that theory should be used to make the global policy tool. Their modifications should be made as per impact of driving factor and adjustment of global policy tool in to local policy tool. The policy should be declared and made fully aware to the stake holders for their enhanced participation in any mission with their clear mind. This strategy will enable efficient and conservative use of resources. Their local customization will indicate the factor that would need revamping and management for enhancement of yield, thus it will involve strategic management of scientific agriculture. These facts add enormous strength to this innovative technology of natural resources management. It will help launch generation II (2G) agriculture in the global scenario.

The agricultural technologies can be broadly classified to have two arms; **a** crop variety improvement and **b.** cultural improvisation including irrigation and nutrient management and auxiliary agronomic practices. The variety improvements can be imported and transferred from one country to the other. There has been good advancement in development of dwarf varieties of wheat and rice that brought green revolution worldwide. **Dr Norman Borlaug** was awarded noble peace prize in the year **1970** for bringing this breakthrough. However, the second arm ie improvisation could not make such break through and remained in producing the bright spot of successes [14], which are on the empirical basis of doing and learning lessons and again doing. The racy nature agriculture is a Sun technology having fixed mode applicable universally in space and time as a Sun technology[17],[18],[19]. Like crop variety the Sun technology has also capability to enhance the harvest index of crops[17]. Thus, the Sun technology[17] also becomes strong arm of agriculture globally. The Sun technology stand parallel to crop variety and it will further enhance the efficiency of crop varieties in increasing the harvest index. The Sun technology will serve as corrective technology to remove the blame imposed on the green revolution that it created the reductions in the ecosystem services. The racy Sun technology is the most superior land, water and environment pro improvement technology. Further, utility of this sun technology will be taken up in the discussion parts, i.e. after many implicating issues and features taken up in this study.

Table14. Nutrient composition of the green manuring crops, compost and NADEPED green manure as well as used as cattle feed

Highest % of nutrient contents		
In the crops		
Subabul (Sisbania)	Green gram (Phasiolus mungo)	Pearl millet
N (3%)	P (0.18%)	K(1.0%)
Anaerobic Compost		
N(.5%)	P(.8)	K(1.1%)
Nadeped Compost		
N(1.5%)	P(1.0)	K(1.4%)
Green manuring		
Nadeped Green Manure (New formation , NGM)		
N(4.5%)*	P(1.0%)	K(1.4%)

* Crop N . Nadeping factor

3.8 Technology for eradication of unsurmounted poor quality of rice due to bad quality of soil, water and the intensive IPM practices,

The degradation of soil and water and to some extent polluted environment lead to distortion and impairs the quality of rice. The factors exist because of the inherent soil and ground water quality due to geochemistry of the area. Example of such bad quality of produce is problem of arsenic that is taken by the crops and consumed by the people as subsistence of food and drinking water. The arsenic is a poison and its permissible limit is 0.2-0.5 ppm and against this existence of As in food and water ranges high. These arsenic poisons accumulate in the cells and cause cancerous problems, leading to the early death of people. The expected longevity in Bangladesh is low because of the As poisoning.

Like the problems of As there exist worldwide problems of fluoride, insecticide and pesticides accumulation with intensive irrigation and fertilizations, particularly, where decompositions occur under anaerobic conditions. These decomposition process produce, hydrogen sulphide, sulphurdioxide and ammonia which have negative charges and get stick to cilia part with positive charge and get absorbed in body[15]. These substances also accumulate in human cells and cause, dental and bone deformation and limit body functions. The researches have been reporting the spread, severity and damages that are coming to the notice (**Table 1**) [14]. However, there has been no solution to overcome these problems. The scientific facts revealed that anaerobic decomposition of carbon produce methane, cellulose, hydrogen sulphide and other fertiliser containing sulphur or even the elemental sulphur form the hydrogen sulphide, which become the sources for the insurmountable problems listed and highlighted in **Table 1**. Similarly under the IPM management chlorinated organic compound get absorbed by plants and reach to the human by food chains. The scientific solution to these problems is by incorporation of functioning of aerobic decomposition of organics and sulphates by different appropriate cycles of carbon, nitrogen and sulphur. These cycle when operate under the aerobic condition do not produce the harmful products. Further, scientific management of irrigation, nitrogen and the sulphur cycle will produce enhanced uptake of phosphate which competes with iron uptakes. The organic sulphate by the aerobic decomposition of the sulphur cycles reduces affinities to arsenic. This fact was substantiated by the lab study[9] and field study[37], not fully equipped with the knowledge of sulphur cycle, further substantiate the innovative application of the scientific facts in the present study. The uptake of P and K get enhanced even with the same amount of water up take by the crops. The decomposition of leguminous bio mass viz green gram, peas and soya beans etc in the form of organic and liquid green manuring has been substantiated by the study[1] and applied in the development of nutrient management package of universally applicable technology the racy nature agriculture[1],[17] is again referred to in **Table 15.**

Table15. Removal of some toxic chlorinated organic by activated charcoal treatment (**De 2010)**

Compound	**Concentration, µg//l**		
	Initial	**After**	**Removal efficiency, %**
Aldrin	48	<1.0	99^{+}
Dieldrin	19	0.05	99^{+}
Endrin	62	0.05	99^{+}
DDT	41	0.1	99^{+}
Arochlor1942 (PCB)	45	<0.5	99^{+}

The addition of PO_4 to As-contaminated soils to minimize As uptake is controversial under non-flooded conditions[60], As III is actively taken up by so-called water channels (aquaporins) in the roots[61]. Laboratory experiments[61] have shown that Boro (dry season) rice cultivars take up less AsIII andAsV than Aman (rainy season) rice cultivars. This may be related to physiological or morphological differences between the root systems[61]. However, this does not imply that Boro rice will accumulate less As than Aman rice under field conditions, because Boro rice is irrigated with As-rich groundwater whereas Aman rice is rain fed.

The uptake mechanism of organic As is largely unclear[61]. It seems that monomethyl arsenic acid (MMA) and dimethyl arsenic acid (DMA) are taken up by rice plants but that the rate of uptake is much lower compared to inorganic. To date, it has not been possible to predict As uptake by plants from the soil. Most papers only include total As concentrations in the soil and the As concentration in the irrigation water. It has been suggested that total As can be regarded as potentially bio available in paddy fields, because most of it is bound to FeOOH. Good correlations between total As in soil and plants are however not always found.
The another aspect of management of the problems enumerated in **Table 15 i**s making the salts either inherited in soil, water or by faulty management of irrigation , or fertiliser and IPM is by creating bio unavailability and fixing the salts in the soil. These bio unavailable elements do not move to the crop so the food chain is saved from the congestion of bad elements. The success of the arrest of the chlorinated organic compounds is displayed by the values in **Table 15.** The racy nature agriculture Sun technology has a built in component to carry out fixing the toxic salts and gases become biologically unavailable. These salts, thus, do not get absorbed by the crops.

3.9 Quality contrast with organic foods

The second arm viz improvisation comprising of cultural practices have been going on as per justification of the effect of local variations. Nothing emerged as universal culture as a cultural practice to make it of universal application. This situation leads to worsening of land, water, environment and lack of resources for the posterity. This situation bogged down all concerned with food, environment and resources conservation globally. The racy nature agriculture has carved many challenges and devised solution to the problems. It would be appropriate to say that a universal innovative practice devised in this present study fulfils all challenges implicating culture i.e. heavy weight arm to strengthen global agriculture. There has been continuing global concern, but with situation of helplessness due to implication of various factors beyond known controls.

The varietal improvement had reached to a level of occurrence and existence of risk in the world agriculture on one hand and the unscientific cultures that lead to the situation of degradation of land, water and environment, all leading to the great worry on the global food supply and its sustainability. The racy nature agriculture will go long way to alleviate the global food situation by enhancing food quantity, quality by way of enhancement in productivity of existing crops and enabling crop diversifications. Many countries which had not been able to produce wheat will be able to produce it in their own country as per enabling situation of racy nature agriculture and get rid of imports. This self dependence will be greatest achievement in world food situation. The World Food Prize is meant to encourage efforts to enhance productivity of small farmers with the overall growth of achieving a better global food security. This technology of at site resources conservation enables all categories of farmers with poor knowledge and financial resources to join the mission of producing enough and good quality food for the globe as an alternative and supplementing technology to any other technology that would emerge in time to come. This will alleviate the danger and the global worry of food demand projected to rise by the year 2050. This fact is revealed by the technology development process. The technology is free from any reservation from the users and the consumers' preference. It's at site application enables generation of employment and eliminates foreign reserves need for importing food. Thus, it is a technology that enables create real global food security by feasible and plausible means. Infrastructures are to be developed locally that will usher industrialisation in countries so agriculture and industries will go, may be in the form of corporations as well, and flourish together

Many countries are known to have fascination for organically produced food. The inherited cultivation practices of organic food production include GHG free operations by the agricultural machineries and tools, no use of pesticides etc that might impair the quality of produce. But, there is no guarantee of controlling movement of heavy metals, toxic gases from the water and the soil and environment where the organic food would be grown (**Table 16)**. As an example, the content of such heavy metals are enumerated here to display the risk of poor quality of organic agriculture.

Table 16 Elemental composition of organic manures, average values (Biswas et al., 2012)

Organic manures	Macronutrients			Some selected heavy metals			
	N	P	K	Fe	Mn	Cu	Zn
	% wet weight basis			Mg/kg dry wieght basis			
Farm yard manure	0.54	0.31	0.51	440	155	10	78
NADEP	0.93	0.52	1.15	215	96	25	56
Vermin compost	1.36	0.48	0.65	619	245	16	45

Note there was no visualisation of building of S sulphur in the organic manures, supporting lack of visualisation of working of sulphur cycle.

The manure characteristics will have important bearing on the quality of organically produced foods. Here in the racy nature agriculture it contains inbuilt mechanism of auto regulation of intake by plants, reduction of impurities of the medium of production including environment and refinement of situations by stabilization of heavy metals etc. Foods rich in nutrient and heavy metal free carbohydrate are obtained for supplementing energy and body balances and functions. The carbohydrates are groups of naturally occurring compounds that include variety of food stuff and fibre, natural sugar and starch L and cellulose. The carbohydrates contain only three elements viz, C, O and H, in the proportion of waterie $Cx(H_2O)y$[15]. Glucose ($C_6H_{12}O_6$) is *hexose* sweet produced in photosynthesis, stored in the form of polymers (long chain molecules),which are largely insoluble in water, known as glycogen in animals and starch in plants. In the racy nature agriculture Sun technology the food and nutrition free of any toxic salts and chemical make insured food superior to organic foods. Further, in the developing scarcity of dung, the basic input for organic agriculture, the racy nature agriculture having no such limitation and better quality content, is a unique agriculture technology for producing good quality sufficient food for all global consumers.

3.10 Designer rice to promote export acceptance

Chapagain and Hoestra[4] estimated global foot print of water for rice production to be 784 billion m^3/y. The study further indicated that for production of rice in India, Indonesia, Vietnam, Thailand, Myanmar and Philippines, the fraction of green water (irrigation water) was substantially larger than fraction of blue water (rain water). USA had the blue water fraction 3.70 times the green water fraction and Pakistan 5.6 times. Blue water fraction in average water use of rice export is bit higher than average rice export produced using green water. Thus, it is evident that lot of water is consumed in rice production. If innovative application of the scientific fact of application of sulphur cycle is made, substantial conservation of water and increase in rice yield can be achieved. The authors study1 substantiated that there had been some knowledge gap in involving function of sulphur cycle in the past.

In this domain, promotion of scientific fact and its suitable application will lead achieving water conservation or increasing water use efficiency and reducing release of methane from the paddy fields. The countries using green water will save lot of energy in application of irrigation water for water lifting and pumping etc. Reclaimed wastewater quantities are matched against specific irrigation needs. Exploitation of such waste water resource are planned to relieve water stress in Crete islands[28].

In Punjab India, under wheat and rice cropping lot of ground water was withdrawn for irrigation that lead to drastic lowering of ground water table. Following this, farmers resorted to direct seeding of paddy crop, where water required for submergence and puddling is relatively less than for extensive puddling. As indicated by study[54]' when submergence and puddling is not available to rice crop, average productivity of rice will go

down. Therefore, in order to avoid reduction in crop yield a proactive practice of submergence and puddling with awareness of scientific fact of sulphur cycle will be a rational and unified practice for rice culture for both using blue or green water and reducing release of methane and global warming. Further, recent application[22] of green manuring of *Sisbania* under upland condition is showing way to maintain paddy yield under intermittently flooding condition, this will also lead to reduction in release of methane gas to environment. But, wheat yield is likely to be not benefited by this green manuring by *Sisbania* crop.

3.11 Performance indicators of ecosystem services

The rice cultivation will be a component of the ecosystems. The technology of production of designer quality of rice shuld produces ecosystem services. The indicators for the ecosystem services are Soil quality (SQ),Water productivity (WP), low external input (LEI), integrated pest management (IPM),water cycling (WC), biodiversity, carbon sequestration (CS) and social capital (SC)[14] . In the Sun technology of racy nature agriculture all of these indicators are acquired for everywhere and all the time to make the technology of designer quality production be true and applicable everywhere and all the times. In contrast to the racy nature agriculture the researches have been able to produce only the bright spots[14]. The bright spots glitter like fireflies and remain in existence for short time and another technology may appear and surpass it. The designer rice production technology being on innovative application of scientific facts of environmental sciences and environmental engineering will remain the best for all time and everywhere. Because of chartering of different elements to build-up, get utilised and again build up, ie in the form of revolving cycles, the productivity and quality will be sustainable all the time. The natural resources use make it functional by using the indigenously available materials and it does not require external input. The technology incorporates ideal way of CS and SC, The amendment of specially prepared biochar offers immense potential of carbon sequestration and in deriving the instantaneous advantage of refining soil and water quality for efficient working of sulphur bacteria for converting hydrogen sulphite in to sulphate. As indicated earlier the uptake of sulphate will promote uptake of phosphate that will reduce uptake of iron and As.

3.12Nutrient upgrading and Toxicity suppressing amendments

The nutrient supplementation of 25 % of total N required by crops by organic manures such as aerobically decomposed animal barnyards organic wastes, by green manuring particularly NADEPED green manuring or liquid green manuring will produce sustainable high yield, produce enhanced sulpho-amino acid food crop, reduce GHGs emission, permit crop diversification, enable bring crop rotation effect, save nutrient and water and bring several ecosystem services. The racy nature agriculture also comprises component for reduction of bioavailability of As, F, and chlorinated organic compounds by adsorption and absorption enhanced capacity of additional amendment of biochar. Thus, the racy nature agriculture will restrict the uptakes of toxic salts and toxic gases in the field. Yadav [17] used these techniques to reduce GHGs emission and enhance productivity of paddy fields.

3.13 Content fortification

The quality of commercial grade fragrant rice depicted in **Table 13** can be enhanced with respect to protein by sulpho- amino acid build up, carbohydrate, energy and some protein by enhancing harvest index. The vitamin A supplement will be possible by external fortification of rice and bean composition of food in rice eating world. The prevailing rice fish-duck pigeon pea and papaya all being grown at the farm stead in the rice growing region is well established and accepted mixed farming culture. Eradication and/ or removal of toxic salts and organic chlorinated insecticides and pesticides by amendment of activated charcol will eradicate the toxicity and poisons in the food. Thus, there is ample scope for internal production practice and the external fortification in the improvement of designer quality of rice.

3.14 Processing

Processing of paddy has come in strong way to refine quality and improve the milling quality. Parboiling of rice is known to lessen the bad burden of arsenic content. However, the excessive polishing removes brawn that contains vitamin. Some consideration should be given to improve the milling process. The craze for brown rice rich in protein is increasing these days. Keeping bran intact in beaten rice should be popularised to eliminate vitamin deficiency in the rice product. Extraction of rice brawn oil, conversion of rice brawn in to ongoing practice of cattle/ poultry feed should be intensified to make the cultivation of rice profitable. The residue management and paddy straw use have strong implications in production of quality and sustainability of rice, which has to be devised by innovative application of scientific facts. Study [17] showed the right way to be followed with extensive research and development.

3.15**Packaging**

Packaging is considered important for marketing and sale of rice. For large consumption of rice the packaging may be in full size (100) kg gunny bag, 50kg or 25kg size. Smaller packets of 10 kg and 5kg bags are also used. One kg packets are largely plastic jars. There is hardly any consideration of keeping quality alteration by the packets of rice. The rice is kept for long time improves it quality. Therefore, the packaging needs some research attention of the packaging materials and size for rice packaging.

3.16 GIr and patenting

The designer quality rice food availability will be possible for larger proportion of global gentry than what is being afforded by the presently known as organic food, which may not be the real pollution free food. The quality of rice contributed by second groups of factors of smell *ie* putrid and pungent character will not spare the organic rally produced rice. These factors are ameliorated in the racy nature agriculture, poised to produce the designer quality of rice. That means rice designer quality will be superior to the well known fascinated organic rice in the world agriculture. The geographical indicator registry and patenting are very important aspects that have emerged and taking strong hold on the research and development. In this domain when unique agriculture technology is applied in production of rice, the emergence of unique quality of rice will be also unique. This will be real development of identification of zone of best quality production of rice. There should be some way and global mechanism to promote and coordinate the GIr based best quality. The South East Asian countries known to capitalise the rice export will get highly benefited by the GIr application in identification and registration. The quality development will be an engine of rice cultivation for enhancement in quality, productivity and protection of environment. These new character of consideration will make rice free from blame of causing environment pollution. The rice eaters will be free from the inferiority complex of eating poor peoples' food.

3.17 Policy implication in agriculture and national economy

As depicted **(Fig 2)** trend of per capita income is the maximum from agriculture in the low income country and lowest in the high income country. In the high income countries the industrial income and service sector income are high. Further, in the recent years the service sector income has also picked up further surpassing the industry sector income. This implies that if in agriculture some service sectors are incorporated the contribution of income from agriculture will also boost. This strategy will boost agriculture, which is weak in the low income countries. This aspect involves creating service sector by devising business process out sourcing for carrying out the specialised jobs of production, processing, fortification of nutrient content, packaging, export etc. The preparation of aerobic decomposition of organic manures, sprinkler irrigation and preparation of raised beds and furrows, precision sowing etc are time sensitive hence availability of machine and tools, experienced manpower will play active role. Study [62] dealt in detail the functioning of BPO in agriculture. These BPOs will work as extension agent and promote adoption of generation II (2G) practice of rice cultivation.

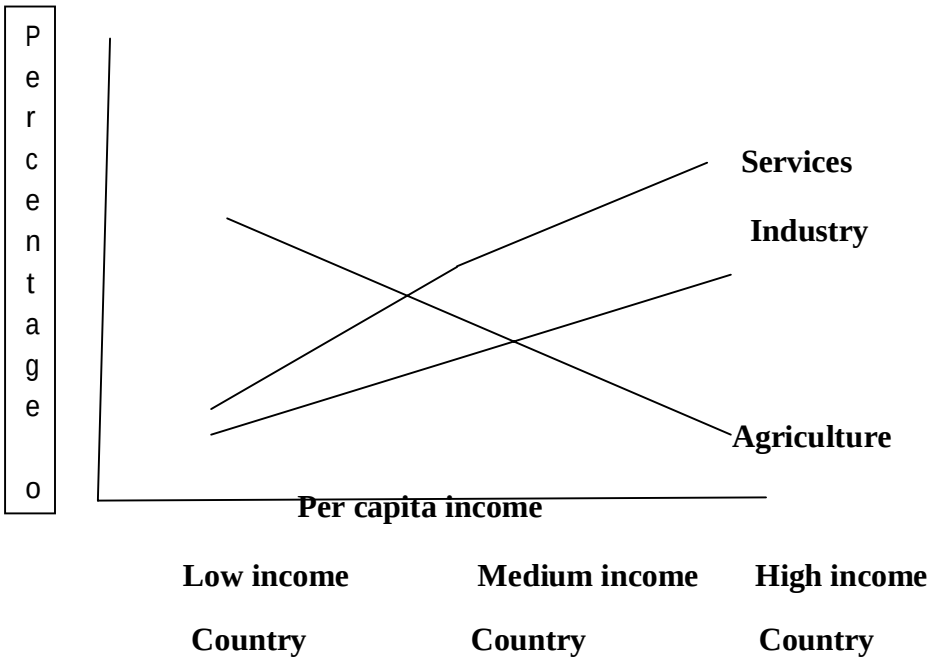

Fig 2. Contribution of primary (agriculture), secondary (Industry) and tertiary (services) in the GDP

Clear-cut and appropriate policy plays vital roles in technology application and development of national agriculture. The technology of designer quality production of rice is fulfilling need of subsistence, land and water conservation and export promotion as well as reduction of foreign reserve expenditure on importing food. The Sun technology will produce world level designer quality rice, improve ecological services and protect environment. The technology is the real example of think global and act local. The global policy will get modified by their impact factor indicating component. Thus, this strategy will bring world agriculture at one platform of quality with respect to nutrition. This Sun technology fulfils the lack of breakthrough in agriculture in food and nutrition like other areas of technological development affecting the daily life **(Table 2).** Because food and nutrition is the basic primary need, it will acquire the first priority of application, implementation and adoption. The Sun technology having ability to produce balanced nutritioned food, will surpass the so called organic food, in the reach of some alighted group to every gentry of globe. These facts need realisation, promotion and adoption by the world food sufficiency thinkers, planners and implementers.

3.18 Revision of food menu

It will be beneficial to add pearl millet in the daily meal to reduce absorption of the As or any other toxic salts (**Table 1**). The pearl millet contains high Phosphorus (**Table 17**) that will suppress the uptake of As from the intestine. The toxic substances will move out of body in the stool. This is a new remedial measure to escape the bad effects of soil and water induced toxicity in the diet as revealed in the **Table 1**. It is logical and experimental corollary of food and nutrition. It should work well. However, it requires detailed planned experimental measurement of variation of As or other toxic content in stool due to change in the food menu and addition of pearl millet. The pearl millet will have to be imported by the rice producing countries from arid and semiarid areas. This fact of food and nutrition will set a new current of transfer of pearl millet in return of rice. The pearl millet should be a new medically supported food substitution in the As problem area/countries. The racy technology will also be applicable to produce designer quality of pearl millet that will be preferred for import.

Table 17. Minerals in pearl millet (μg/g mfb) source Gupta (2000)

Samples	Ca	Mg	Zn	Fe	Na	K	P(x10^{-2})
RMPI Cl	99	1167	38	73	43	3660	66.5
HMP 1700	132	1330	31	61	43	3864	74.8
Serete 3A	126	1384	30	78	41	3679	79.4
HMP550	89	1389	28	79	45	4605	86.4
% variation	48	19	36	30	10	26	30

% variation = (highest-lowest)/ lowest x100.

4. Discussion

Food is the basic need of any human being and rice is the food of almost 50 percent of global population. The countries where rice is grown due to circumstantial situation have low lying agriculture land and the rainfall is high making compulsion for rice cultivation, given inferior status of prestige, particularly standard of living. The extremes of rainfall events producing floods and in situation of low rainfall make production of rice fluctuate with wide variations. The situation in the major rice growing area is characterised as poor nutrition because of lack of many protein contents of rice. The rice production system is highly laborious and poor working field job of mud, water, tiring and unlinked one. The vagaries of weather play to harden the production reduction and land water and environment working condition difficult. The circumstances compel to grow rice after rice and the geochemical situations worsen the quality of rice and cause many health hazards. The poor situation impair the quality of life of rice eating people in the extensive rice cultivating areas, south east Asia in particular and rest part of world, in general.

4.1 Quality implications

The nutritional quality of rice is highly variable. The protein content is low and the region where rice is the main foodcrop other sources of protein are also limited due to lack of crop diversification and development of biodiversity. Normal protein requirement is 0.75g/kg body weight. Due to lack of diversification in the rice growing regions the variety of protein is limited; resulting in the shortage of protein in general. The rice contains low content of two proteins viz thiamine and cystein. As rice becomes the main staple food the other types of protein become unavailable. Further, rice contains all types of sulpho amino acid but the geochemical settings make soil and water quality to degrade the sulphoamino acid also. These situations result in protein shortage, in general. The vitamin content also being low is known to cause the similar situation. The review revealed the lowest per capita availability of protein is mainly in the rice growing countries viz Bangladesh, Philippine, Thailand and as an exception, Nigeria (Protein availability around 49g/capita/d) to the highest availability in France followed by U.S.A, Italy and USSR (112-106mg/capita, /day). Thus, there is vast difference between consumption of protein by the nationals of different countries. The amino acids are the building block of function of cell that support life and control the longevity of life. This implicates that longevity of life span in the rice eating countries is subjected to reduction of life span.

The situation about vitamin deficiency is still on miserable front. The FAO study reported data in 1993, included in the present study, revealed the vitamin A deficiency was the maximum in 10 million children in the South East Asia including India that constituted 72% of global problem children. This bad situation occurred due to unfavourable situation causing limited crop diversification which can be grown to supplement the food. The rice crop does not contain the vitamin A. The shortage of Protein Thiamine, lysine and vitamin A became set back of human health. The protein and vitamin deficiency play vital role in the development of human brain in two years of age, but its functionality activates about two decades later [15].

The mineral requirement of food is although small, but the poor land, water and environmental conditions make disorder either of some deficiency and excesses in the body uptake. The disproportionate mineral in the body disturbs various homeostatic and balances in the bodies are maintenance of acid /base, water balance, contraction of muscles and normal response of nerves to physiological stimulation and clotting of blood. As brought out earlier the mineral and vitamin deficiency affect the greater number of people in the world than the protein mal nutrition. The mineral nutrition deficiencies are regulated by taking extra doses of iron, folic acid, iodine and vitamin C. The excess of minerals which come to the body through food and water are Ca, Mg, P, K, S, Na, Cl, and Mg. Other found in traces are Mn. Cu, I, Co, Zn, and Fl. About 4-6% of body weight is made of mineral element. To get rid of disturbances due to excess or shortage of the body functions regulated, people have resorted to take organic foods which is deemed to be free from the excess salts. Thus, the present study substantiated that the present day produce of rice remained deficient of protein, vitamin and mineral nutrition. Further, in the wake of production of sufficient food, poor and degraded condition of water, soil and environment make the food and nutrition situation from bad to worse. This study took a challenge to ameliorate the food production and environment protection by innovative application of the scientific facts to develop designer high quality rice. The innovative technology developed in the form of a capsule of best known practices and application of scientific facts of carbon, nitrogen, sulphur, phosphorus cycles to function under the worsening situation of hydrologic cycle due to global warming causing the non manoeuvrable climate change. Since the food requirement is persistent, its supply is also to be produced on sustainable basis. Food sufficiency to fulfil the basic/physiological need is important factor in control of market dependent economy and governance of countries. The food shortage and taste of food have triggered socio political problem dramatically in some countries and as slow endemic disease in general in most of developing countries of the world. The scientific review of past researches established that the small scientific lapse caused ocean size problems related to food and environment in the world. The small scientific lapse was the lack of visualisation of working of sulphur cycle which is an essential element in the plant growth. The productivity of water and nutrient is enhanced by the working of sulphur cycle if it goes under specific situation of aerobic decomposition. In the rice growing countries the geochemical and the landscape situation remained beyond control and the decomposition processes went under anaerobic condition causing methane and nitrous oxide[16,17,57] which contribute to the GHGs accumulation in the environment. Thus, paddy cultivation being a compulsion due to physiographic and rainfall situation bore the blame of causing environmental pollution and global warming.

This study produced solution for bringing productivity, designer quality of rice and protection of environment. It applied scientific principles of environmental sciences and environmental engineering for devising the green panacea technology named as racy (alive, smart and enthusiastic) nature agriculture[17]. Various aspects of technology development process, validation and application and other technology contrasts have been documented[17]. Devica[38] advocated use of microbes for increasing availability of nutrients to plants. The micro-organisms in the rhizosphere can mobilize phosphate from $Ca(PO_4)_2$ in the soil. The biosphere contains about 78% nitrogen gas. Micro-biological studies have proved that solitary application of cyanobacteria (*Anabaena azoltae*) under rainfed farming lead to enhancement in grain yield (23%), straw yield (28%), grain wt (26%), carbohydrate level in grain (10%) and in straw (17%), protein content of grain (22%) and straw (19%) over the respective control. For rice crop combined application of balanced fertilizer and the cynobacteria resulted improvement in yield (83%) and straw yield (40%), grain wt (25%), grain carbohydrate level (10.4%) and straw (20%), protein content in grain (45%) and straw (26%) over the respective control [30]. Maximum reflections of increases were found in combination of cyanobacteria with combination of fertilizers doses in the grain yield and the protein content of grain. The gain from the cynobacterial application was more for wet land rice than for the rainfed crops. Protein is the source of amino acid in the body cells.

This technology has surpassed world over best technology of land, water and natural resources conserving technology which bring successes in the local domains and glitter for short time in isolation as lights emitted by the fireflies. The racy nature has been brought to status of the Sun technology which is universally applicable

for all soils, crops and both irrigated and rainfed agriculture. This unique feature of the innovative technology is described in several research articles [16],[17],[18],[19],[20].

The designer quality rice producing technology builds the quality displaying variables which can be measured and expressed with unit of measurement and the one which cannot be measured, but can be evaluated by progressive assessment of peoples considered opinion by standard Delphi method [55]. These designer quality characters are the one developed by the genetic improvement, and specially formed by the manoeuvred soil, water and management engineering applications. Management of other aspects of milling and paddy processing of rice production and cooking expertise and extra fortification of vitamin etc add to the quality character. The technology substantiates justification of well known practice of rice, fish, duck and pigeonpea and papaya culture practice at the farmstead level in south East Asian countries including eastern part of India, Bangladesh Phillipne and Bangkok and even in China. This fact makes dents on improving nutrient composition by the extra and external addition for enhancing nutrient condition of the designer rice.

It is substantiated established fact that this production technology will produce rice quality better than that one would expect from the organic rice because of inbuilt provision in the technology. The technology focuses the year round cropping pattern and it impacts on enhancement of crop productivity and protection of environment and saving in the water for rice production. The unique production technology applicable for all crops, cropping patterns and irrigated and rainfed condition will produce global level designer rice production. Application of the GIr and patenting will need fortification of the quality monitoring and rating to establish zone of designer rice production. This will uplift the status of global rice production from low to another plateau. The designer quality produce of rice will fulfil the quality need of developed quality conscious as well as the both quality and production demanding developing countries. The multiple utility product of designer rice, and the multiple use of the by products of rice such as husk, brawn and paddy straw will make the paddy cultivation remunerative, prideful and protect environment. It will require global effort for dissemination and generate production experience by imparting training and demonstration involving visual display and touch[15] those are implied by doing and learning, as established by the scientific fact of human ability for adoption of innovations. Author's study[63] applied the adoption by diffusion of innovation, famous Rogers theory of adoption. The scientific fact of adoption of innovation behaviours have been attempted with successes and failures [64-69]. Innovative application based on the scientific facts shows clear direction and frame work of research in the extension of the innovation of designer quality rice technology. The developments in this innovative technology of food supply and economic developments fulfil all the aspiration of thinkers, planners and policy implementer [70-72] towards income distribution disparity, economic developments, health building and protection of environment. It needs its adoption and derivation of benefits from other scientific technologies as brought out by **Table 2.**

4.2Genetics and culture improvisation for promotion of nutritional quality of food grains

The mineral contents in pulses are highly variable among cultivars. Varietal difference in accumulation of P, K, Mg, Na, Ca, Mn, and B complexes were significant in most plant materials studied. The consistency in performance of mineral types across the years and locations indicates that a single environment may suffice when screening genotype for differences in mineral accumulation[21]. Genetic correlation involving accumulation of a particular element in seed and seedlings leaves was positive. In soya bean seed P, Ca, Mg and Mn accumulations were highly positively correlated with first leaves of seedlings[21]. On the contrary, boot stage leaves mineral nutrient content against seed mineral content should also have significant correlation. However, the environmental, soil and cultivation practices, water and environmental actions are different which control the mineral intake of varieties. Testing of these mineral accumulations under racy nature agriculture[17], which is universally applicable across the climate, soil, water and environment interaction will produce a comparable result. These two unified approaches will clarify many doubts on the subject and will open new dimensions of research on mineral uptake by the crops including cereals, pulses, oils and vegetables. Lot of adjustment in nutrient enrichment and regulatory measures can be enforced and exercised in the racy nature agriculture[17]. Thus, land and water management through racy nature agriculture will support and standardise the research

efforts that have been devoted on genetic improvements of crop varieties. Racy nature agricultures[17] will become a supportive and supplementary technology in enhancing global mineral nutrition from the food crops and elimination of global nutritional deficiency.

5. SWOT analysis

The presented here is solution of 50 percent global gentry dependent on rice as staple food in the developing countries for subsistence and in the developed part of the world for delicacies. The following analysis is devoted on the issues related to the capability of the novel study.

5.1 Strength

The study has produced a solution of development and production technology for high quality designer rice not for a specific site but for entire soil, climate, cropping systems crops and irrigated and rainfed agriculture. The technology of production is based on innovative application of scientific facts known in environmental sciences and environmental engineering. It is free from any scientific flaw and any discrepancy that makes it universally green technology of enhancing food productivity, quality improvement and protection of environment. The quality of rice produced by the green technology will surpass the organic food deemed to be known best for keeping sound health and body function in the sure way against the uncertainty involved in organic good production. Thus, the technology developed in the study makes full scientific use of natural resources, creator of sustainability, and producer of quality food and protection of environment. The inbuilt component of the technology will conserve water and improve the ecosystem services where agriculture will form the essential component for production of food crops.

The scientific facts and knowledge about the nutrient content of the crops enabled devising food menu for reducing adverse effect of As in people solely dependent on rice. *viz* Bangladesh, south east Asia, Phillipine and Chinese etc. The food menu should contain some proportion of pearl millet which has phosphorus, that will reduce movement of As in to the blood stream across the intestinal wall. The unabsorbed As will be out out of human bodies in fecal and urinary excretion. This is a scientific solution. It needs scientific monitoring to fix the limits of transfer of As from the body as affected by change in the food menu. In the recent years use of multigrain flour has gained popularity but the real scientific justification has not come to the minds of the users. This, reformation of food menu will set a new business of import of pearl millet from arid and semi arid areas to the excessively wetland where rice is the only crop that grows and pearl millet does not grow in the region or country for people living on the rice infested with As. The scientific premises used in the present study will serve equally well in devising universally green technology for horticulture, forestry and agro forestry crops. It is going to work well for natural as well as built environment agriculture such as poly house or controlled environment agriculture. The green technology will work well with the worsened conditions that may be existing at present and bring improvement in due course of its use for conserving resources for posterity. Thus, the study has produced a Sun technology which is true for today, tomorrow and indefinitely, unlike the bright spot technologies known world over[14]**.**

5.2 Weakness

The technology devised in the present study has no weakness. Any weakness that may appear to the scientific world is over shadowed by the scientific facts that backup the development already established and substantiated by the other referred studies of the author.

5.3 Opportunity

The technology of designer quality rice production having 17 factors of variables and attributes provide good opportunity of production with enhancement in quality, quantity and environment production making all countries self sufficient without requiring foreign reserve for importing food. The technology uses indigenous

resources and does not require external input. It fulfils all requirement of an ideal technology of land, water management and natural resources conservation. It uplifts level of agriculture for quality food production and use of paddy by- products in industrial uses, for oil extraction from the rice bran, husk as energy source and for poultry or cattle feed. The paddy straw will find innovative application for preparation of manure to supplement the nature food production that will again produce quality food. Thus, it makes best use of resources. Further, application of the scientific facts enable devise food menu to curb absorption of As and a like toxic substance (**Table 1**) by the human body. Other resources conserving technologies had weakness of unscientific base and suffered at random application of ideas to conduct research, learn lessons and again apply, that produced inconsistent results, making it go as indefinite activity. The results culminate as bright spot and glitter for short time as lights emitted by the firefly in isolation. The technology brings agriculture that remains in generation I (1G) to generation II (2G). It has inbuilt mechanism to further refine by customisation to bring improvement for the generation III (3G) agriculture (**Fig3**). Thus, the study has produced technology to eliminate global worry of food and environment protection world over.

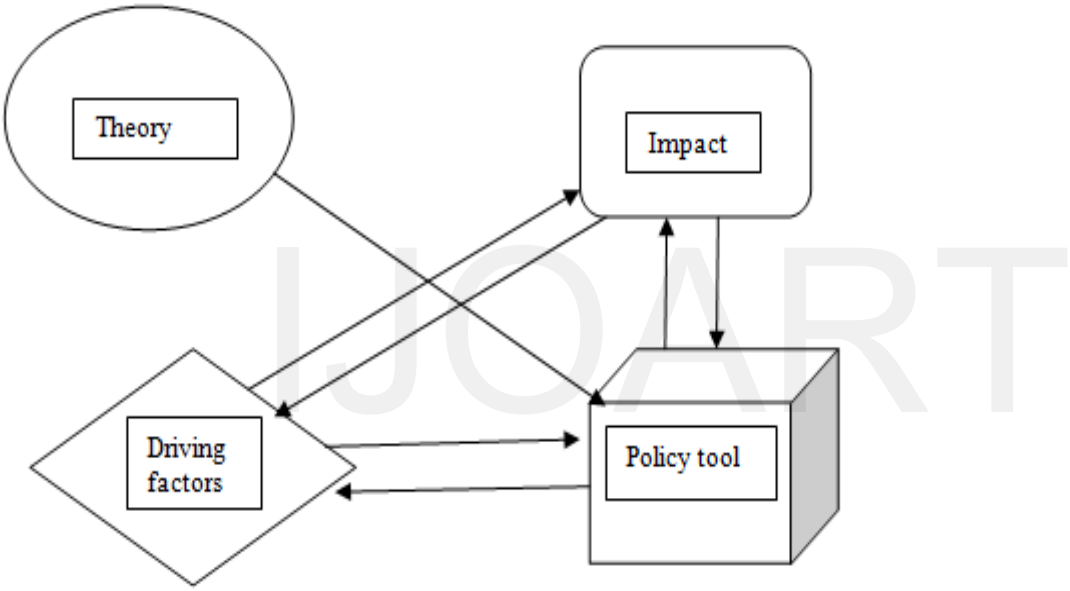

Fig4. Link network of Theory, Impact, Driving factors and Policy tools

5.4 Threat

There is no threat from the application of technology**.** Nevertheless, it is not free from the threat of apparently non acceptance of the scientific world the unique development for solving the global problem of food and environment. It is expected that scientific community will accept the fact, as the problem is already accepted, the solution as well. The acceptance of reality of grave situation of problem and this wonderful solution will bring human welfare and feel good effect of food sufficiency and good environment for living.

5.Conclusion

The study established that the genetically produced protein and vitamins content in rice are at low level and discrepant. The racy nature agriculture incorporates soil, water, nutrient, weeds and intercultural condition for aerobic decomposition and adoption of cropping patterns that nutrients are built by preceding crops are utilised by the succeeding crops. Thus, in addition to genetically induced quality, improvisational technology also plays

good role in the quality build up of rice. Genetically inbred quality, additional quality built by scientifically innovated practices in paddy production, many other inbuilt qualities induced by processing such as parboiling and milling and external fortification of vitamin A produce designer quality of rice for producing good health and feel good effects. Universal applicability of the innovative green technology seizes possibility of global best designer quality of rice that will enable demarcation of zones of rice production. Modification of meal menu by adding pearlmillet in the menu,which contains phosphorus, will reduce uptakes of As and alike poisonous elements to avoid problem of cancer at the later years of life. The multiple uses of the rice, that for paddy by products and the cooking expertise make rice a food sufficiently strong in protein and vitamin content quality and adoptive for deriving income and protection of environment. The racy nature agriculture will serve as a unique technology for improvisation of land, water and secondary natural resources management for any variety to eliminate the limitation for the rice eating global gentry.

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