ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 8, Issue, 09, pp.39104-39109, September, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

RECLAMATION OF ABANDONED AQUA PONDS IN KRISHNA ZONE OF ANDHRA PRADESH

[1,*]Hema, K. and [2]Lakshmi, G. V.

[1]Examination Cell, ANGRAU, Guntur-522 509, Guntur Dt., Andhra Pradesh, India
[2]APGLIC, Lamfarm, Guntur, Guntur Dt., Andhra Pradesh, India

ARTICLE INFO

Article History:
Received 07th June, 2016
Received in revised form
18th July, 2016
Accepted 10th August, 2016
Published online 30th September, 2016

Key words:
Aqua Pond,
Reclamation,
Yield and Physico Chemical Properties.

ABSTRACT

Aqua culture has spread fast in coastal region of Andhra Pradesh during last two decades. but due to the erratic distribution of rainfall and adverse effects of climate, the aqua culture has failed partially. Heavy losses incurred by aqua farmers due to failure of crops. There by farmers were forced to abandon these ponds and started growing paddy. Alternate strategies are needed for the reclamation process for sustainability. In this situation, there is a need for reclamation of abondedaquaponds and the techniques were developed (based on research conducted by CSSRI, Karnal and sub center) to reclaim the abandonaquaponds. To create awareness among the farmers, the study was carried out in different villages of selected farmer fields from 2012 to 2014 in Guntur district of Andhra Pradeh. The adjoining fields of aqua culture ponds was affected severely up to 20m and thereafter the severity decreased wherever trenches were not made around the ponds to control the seepage. The concentrations of NPK in the plant samples were low while Na concentration was high due to soil salinity. Implementation of reclamation practices like application of gypsum, (leaching of soluble salts) which are accumulated in the pond surface layer, they get dissolved, diluted & drained out through drainage channel, followed by growing of dhaincha green manure and *insitu* incorporation. The EC levels of abondedaquaponds were drastically reduced from 22.0to 1.05 dSm^{-1}. The soil pH levels get neutralized from 9.77 to 7.21. Whenever the EC & pH values decreased & neutralized the availability of nutrients are increased & increased the crop yields from 12 to 43% compared to earlier.

Citation: Hema, K. and Lakshmi, G.V. 2016. "Reclamation of abandoned aqua ponds in Krishna zone of Andhra Pradesh" *International Journal of Current Research*, 8, (09), 39104-39109.

INTRODUCTION

In Andhra Pradesh many rice fields in Coastal areas are being converted into brakish water fish farms due to high remuneration for the last one decade. Farmers draw brackish water through creeks in to the land to an extent of about 5 to 8 km and stored millions of gallons of salt water on surface in big tanks leading to change in soil properties and also the coastal ecosystem which is known for its diversified plant and animal activities. Further, the area under shrimp farming in coastal districts of Andhra Pradesh increased so rapidly that it reached to an extent to as high as 1 lakh hectares. The consequence of it is that the adjoining cultivated fields are affected due to secondary salinization leading to reduction in crop yields. The worst phase of it is that the ground water get contaminated and habitats of coastal areas are deprived of even drinking water. However, in recent past aqua culture recorded heavy losses due to failure of crops and market.

****Corresponding author: Hema, K.,***
Examination Cell, ANGRAU, Guntur-522 509, Guntur Dt., Andhra Pradesh, India.

Hence, the farmers were forced to abandon these ponds, which are characterized with high soil salinity and poor ground water. The management of these ponds uplifts the socio-economic conditions of farmers besides improving the coastal eco-system. The state of Andhra Pradesh situated on the eastern coast of India, with a total geographical area of 2,74,000sq km is the fifth largest state, accounting for 8.4% of the country's area with a population of seventy million. The state extends from 12^0 37' to 19^0 54'North latitude and 76^0 46'to 84^0 46' East Longitude. The state comprises of three geographical regions namely the Coastal Andhra, Rayalaseema and Telangana. Coastal area occupies 92,906 sq km & approximately 77 percent of the population is dependent on agriculture, which contributes over 60% of the state income. About 42% of the geographical area is under cultivated crops. In addition to crop cultivation coastal area farmers has gone into aquaculture also. Aqua culture has spread fast in coastal region of Andhra Pradesh during last two decades. But due to erratic distribution of rainfall and adverse effects of climate, the aqua culture has been failed. Heavy losses incurred by aqua farmers due to failure of crops and non-remunerative. There by farmers were forced to abandon these ponds & migrating to other areas as labour.

These farmers who are mostly small & marginal are ready to take the crop i.e. rice cultivation which will impose the economic condition of the farmers along with improvement on overall environment. Alternate strategies are needed for the reclamation process for sustainability. In this situation, present study was carried out for reclamation of abondedaquaponds and getting sustainable yields in paddy.

MATERIALS AND METHODS

An operational research project was conducted from 2012 to 2014in farmer fields of Gokarnamatam and Adavuladeevi village of Nizamptnam Mandal and Ganapavaram in Karlapalem Mandal in Guntur district during *kharif* season. Experimental site was selected, where aqua culture is practiced. With the help of local NGO's an area about 20 ha leveled, irrigation & drainage channels were prepared. Since alkali soils are generally rich in P and K, their application could be normal. Implemented and demonstrated technologies *viz.,* land leveling, adequate drainage provision for removal of excess water, application of amendments, leaching, selection of crops and cropping sequence and nutrient management (Fig.2). Powdered gypsum was added along with organic manures, SSP for efficient reclamation. The green manure crop dhaincha was incorporated at 50% flowering stage. Normal recommended dose of fertilizer for rice crop during *kharif* is 120-60-40 kg NPK ha^{-1} but we are applying 50% extra nitrogen only than the RDF i.e., 150-60-40 kg NPK ha^{-1} to meet the nutrient requirement of the crop due to more nitrogen losses occurred in alkali soils compared to normal soils.

Application of $ZnSO_4$ @ 50kg ha^{-1} was done at basal to avoid the Zn deficiency in crop due to high exchangeable sodium content in the soil. Entire Phosphorus, half of nitrogen and potassium were applied as basal dose and remaining nitrogen and potassium was applied in two equal splits at active tillering and panicle initiation stages. Salt tolerant paddy varieties viz., NLR –145 and MTU-2716 were grown with increased population & higher doses of Nitrogen. After incorporation of green manure & gypsum the fields were puddled & water was drained. Collection of initial soil samples along with GPS co-ordinates and analysed for pH,ECe, cations, anions and available nitrogen, phosphorous and potassium. Soil EC, pH, cations & anions were analysed by standard procedures given by Tandon (2006). EC and pH of soil-saturated paste were determined and SAR of the soil was also computed according to the following equation $SAR = Na+/[Ca^{2+} + Mg^{2+}/ 2]^{1/2}$ (US Salinity Laboratory Staff, 1954).

Sodium of soil saturation extract was determined using flame photometer (Thomas, 1982).Ca^{2+}+Mg^{2+}cations were determined by titrating the saturation extract against 0.02 N EDTA solution to blue end point using NH_4Cl + NH_4OH buffer and "Eriochrome Black T" as an indicator (US Salinity Laboratory Staff, 1954). The available P was estimated by the method of (Olsen *et al.,* 1954), The available K was estimated by flame photometer (Jackson, 1973).The initial soil pH and ECe, available nitrogen, phosphorous and potassium values ranges from 9.77 to 8.12 and 6.8 to 22.0 dSm^{-1}, 217 to 282, 26.4 to 34.6 and 325 to 463 kg ha^{-1}, respectively (Table 1).The AICRP on Salt affected Soils and Use of Saline Water in Agriculture, sub center Saline Water Scheme, Bapatla has been developed a technology to reclaim the abandon aqua ponds given below. Selected the site where the farmers abandoned aqua ponds. All the selected farmers are small and marginal category, especially in coastal area of Guntur district. First activity is the constructions of bunds and leveling the land. A well-planned field layout will be prepared to ensure that each field receives water and field drains are appropriately connected to collector and main drains. All fields should be easily approachable for field operations and supervision. The irrigation system should deliver water uniformly to all parts of the field while the drainage channels are used to remove excess irrigation or rainfall. With the help of local NGO's an area about 20 ha leveled, irrigation & drainage channels were prepared. Appropriate drainage channels will be constructed with dimensions of 0.5m bottom width and 0.6m depth. Application of chemical amendment, we choose gypsum because which is cheapest and easily available material and department of agriculture has supply gypsum to the farmers at subsidized cost. The quantity of gypsum required based on field evaluation.

Gypsum should be properly powdered, broadcast the gypsum uniformly and mix in shallow depth and apply a heavy irrigation and keep the land flooded with water for at least 8-10 days. Leaching refers to the process of removal of soluble salts or exchanged products by the passage of water through the soil. It is accomplished by ponding water on the soil surface so that water percolating through the root zone dissolves the soluble salts and exchanged ions and takes them along with it below the root zone. To encourage the farmers AICRP on Salt Affected soils project, Saline Water Scheme, Bapatla supplied green manure seed (dhaincha) & also gypsum @ 1.5t/ha for each farmer for adaption of reclamation technologies. After leaching of soluble salts growing of green manure crop like dhaincha @ 5 t ha^{-1}, sunhempetc and insitu incorporation at 45 day after sowing. High pH, high exchangeable sodium, high amounts of $CaCO_3$, negligible to low organic matter content and inhospitable soil physical environment of alkali soils affect the transformation and availability of native and applied fertilizer nutrients.

These soils, are deficient in Ca, N and Zn, but are rich in available P and K. Application of organic manures like Farm Yard Manure, Poultry Manure, Vermicompost *etc.,* @ 5 to 10 t ha^{-1} not onlyimprove the availability of nutrient to the crop plants and also improve the physical properties of the soil. Choosing of salt tolerant varieties for growing in the initial years of reclamation is the best option for getting optimum yields. In Paddy NLR-145, Deepthi, MTU -2716 *etc.,* are alt tolerant varieties. Due to unfavorable soil conditions like aeration, low infiltration rate, drainage etc, toxicity of carbonate and bicarbonates death of the plants is more to maintain optimum plant stand to decrease the inter row spacing and increased the density of palnt population to 150% is the best method for getting optimum yields. Practicing transplanting of old age paddy seedling (more than 25 days age) planted 2-3 plants /hill with closer spacing. To avoid the death of the plants and maintain optimum plant stand in the field for getting maximum/ optimum yields. Availability of Zn is reduced due to high pH of soils to avoid this problem

application of $ZnSO_4$ @ 50 kg ha^{-1} to the soil as a basal and as well as foliar application @ 2% is recommended for paddy crop.

RESULTS AND DISCUSSION

Precipitation received during crop period of *kharif* sea son 1011.6, 1460.9 and 657.4mm in 2012, 2013 and 2014 years respectively. During 2013 in the months of September(335.2 mm) and October (497.9 mm) high amount of rainfall received and where as the 2014 year 40.8 % deficit rainfall (657.4 mm) received than the normal. Lower yields recorded during 2014 compared to 2012 and 2013 years due to deficit rainfall and tail and area of canal(Figure 1).

Physico- chemical properties of the soil

Soil pH

The soil pH values were decreased due to adoption of reclamation technology compared to initial soil values. The initial soil having pH ranged from 9.77 to 8.12 decreased to 8.06 to 7.21 (Table 2). The decrease in soil pH due to gypsum application was probably due to replacement of sodium by calcium.

The decrease in pH may due to removal of exchangeable sodium from the soil column. Moreover, gypsum solubility is also enhanced because of the incorporation of dhaincha. Besides, large quantities of CO_2 must have been evolved during leaching process, some of which would become soluble in soil solution giving carbonic acids. These results are in agreement with Trilok *et al.* (2010). Haq *et al. (*2001) and Prapagar *et al.* (2012) reported that soil pH was decreased due to leaching of soluble salts with gypsum application might be due to water promoted gypsum dissolution, expediting the reclamation reactions and improvement of soil.

Soil Electrical Conductivity

The soil ECe values were decreased after three years of reclamation compared to initial soil values. The initial soil the ECe values ranged from 6.8to 22.0 dSm^{-1} and decreased to 0.30 to 0.40dSm^{-1} (Table 2). This might be due to leaching followed by *insitu* incorporation of dhaincha. Leaching was effective in decreasing soil salinity. This may be due to addition of organic matter through *insitu* incorporation of green manure of dhaincha can accelerate the leaching of Na^+, decreased the ESP, EC, and increased the water infiltration, water holding capacity and aggregate stability.

Table 1. Initial soil analysis and ionic composition of aqua ponds fields

Sl. No.	Name of the Farmer	pH	ECe (dSm^{-1})	$CO_3^=$	HCO_3	Cl^-	$SO_4^=$	Ca^{+2}	Mg^{+2}	Na^+	K^+	RSC	SAR
				($meqL^{-1}$)									
1	Sri Dasaradharami Reddy	9.00	18.5	4.80	3.2	174.0	2.38	32.0	55.6	95.13	2.88	-79.60	14.37
2	Sri. Edukondalu	9.77	22.0	0.20	5.6	150.0	0.32	42.0	32.0	146.4	1.31	-68.20	24.07
3	Smt. UppalaPushpavathi	8.42	16.0	1.80	6.6	126.6	0.23	35.0	27.0	94.0	3.76	-53.60	16.88
4	Sri. V.Sivaramakrishna	8.80	6.8	2.80	4.2	58.0	0.27	10.0	8.4	49.0	0.97	-11.40	16.15
5	Sri. V. SambasivaRao	8.86	13.0	0.00	5.4	125.0	0.36	15.6	28.4	84.7	1.67	-38.60	18.06
6	Sri. M. SuriBabu	9.38	14.5	0.80	6.4	138.6	0.21	35.8	22.8	84.6	1.80	-51.40	15.63
7	Sri. M.VenkateswaraRao	8.83	10.3	0.00	6.8	97.2	0.25	10.0	26.0	66.18	1.40	-29.20	15.60
8	Sri.V. VenkateswaraRao	8.60	9.2	0.00	3.6	88.0	0.34	13.6	14.2	60.7	1.55	-24.20	16.28
9	Sri. S. Naga Krishna	8.12	11.0	2.00	5.4	103.5	0.65	11.2	18.4	80.09	1.46	-22.20	20.82
10	Sri .U.VenkateswaraRao	8.20	14.0	3.40	2.0	135.6	0.43	21.6	37.2	80.83	1.42	-53.40	14.91
11	Sri. A. SambasivaRao	8.36	10.2	0.00	4.8	108.0	0.09	16.0	16.8	79.0	1.49	-28.00	19.51
12	Smt. K. Dakshnayamma	9.74	11.5	1.60	4.8	101.0	0.3	14.4	7.6	84.89	1.22	-15.60	25.60
13	Sri. K. Syamala Kumar	8.88	11.5	0.00	5.6	110.0	0.24	12.8	9.6	92.0	1.15	-16.80	27.49
14	Sri. D. SrinivasaRao	8.76	11.1	0.80	1.2	110.0	0.28	14.8	21.2	74.8	1.35	-34.00	17.63
15	Sri. S. Edukondalu	8.52	17.5	0.00	6.8	168.0	0.25	21.2	41.6	112	1.50	-56.00	19.99
16	Sri. P. V. Reddy	8.50	12.9	0.20	5.9	124.0	0.54	21.2	15.2	91.1	1.76	-30.30	21.35

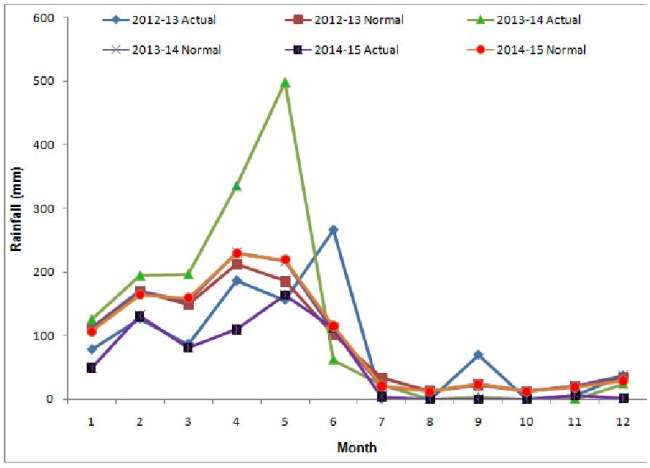

Fig.1. Rainfall distribution in experimental area of aqua ponds

Table 2. Final soil analysis and ionic composition of aqua ponds fields

Sl.No.	Name of the Farmer	pH	ECe (dSm^{-1})	$CO_3^{=}$	HCO_3	Cl^-	$SO_4^{=}$	Ca^{+2}	Mg^{+2}	Na^+	K^+	RSC	SAR
				($meqL^{-1}$)									
1	Sri Dasaradharami Reddy	7.38	4.09	0.00	1.80	22.12	15.22	8.50	11.20	17.09	4.81	-17.90	5.45
2	Sri. Edukondalu	7.21	1.05	0.00	1.00	5.24	4.16	1.28	4.24	5.48	0.87	-4.52	3.30
3	Smt. UppalaPushpavathi	7.22	2.42	0.00	1.60	13.12	9.17	1.85	4.40	18.42	1.35	-4.65	10.42
4	Sri. V.Sivaramakrishna	7.43	4.33	0.00	1.85	18.54	23.25	4.85	13.20	24.05	1.34	-16.20	8.01
5	Sri. V. SambasivaRao	7.53	3.51	0.00	1.84	16.30	17.50	4.80	15.20	13.88	1.16	-18.16	4.39
6	Sri. M. SuriBabu	7.61	1.43	0.00	0.80	6.58	7.04	4.20	6.85	3.95	0.30	-10.25	1.68
7	Sri. M.VenkateswaraRao	7.45	1.88	0.00	1.10	6.54	10.65	1.60	8.35	7.25	0.98	-8.85	3.25
8	Sri.V. VenkateswaraRao	7.81	1.38	0.00	1.42	5.80	6.16	1.20	5.60	6.17	0.80	-5.38	3.35
9	Sri. S. Naga Krishna	7.42	3.68	0.00	4.40	10.20	21.55	2.80	8.56	24.25	1.24	-6.96	10.18
10	Sri .U.VenkateswaraRao	8.06	1.87	0.20	7.60	4.70	5.55	3.20	5.60	9.88	0.81	-1.00	4.71
11	Sri. A. SambasivaRao	7.53	1.03	0.00	1.20	4.66	5.22	1.58	4.80	5.96	0.17	-5.18	3.34
12	Smt. K. Dakshnayamma	7.52	11.61	0.00	20.50	56.12	39.30	28.40	39.14	44.50	4.66	-47.04	7.66
13	Sri. K. Syamala Kumar	7.46	5.24	0.00	1.60	24.20	26.20	1.20	14.50	36.25	1.67	-14.10	12.94
14	Sri. D. SrinivasaRao	7.71	3.67	0.00	1.60	12.80	22.30	5.35	10.84	19.75	2.26	-14.59	6.94
15	Sri. S. Edukondalu	7.73	10.82	0.00	10.20	46.50	51.50	21.60	32.50	51.08	2.75	-43.90	9.82
16	Sri. P. V. Reddy	7.76	1.37	0.00	0.50	2.05	11.42	2.20	4.70	6.27	0.56	-6.40	3.38

Table 3. Available nutrient contents of aqua ponds fields

Sl.No.	Particulars	Initialsoil (kg ha^{-1})			Final soil (kg ha^{-1})		
		N	P_2O_5	K_2O	N	P_2O_5	K_2O
1	Sri Dasaradharami Reddy	244	29.1	436	206	30.4	455
2	Sri. Edukondalu	217	30.2	431	182	33.6	449
3	Smt. UppalaPushpavathi	223	26.5	456	168	31.3	478
4	Sri. V.Sivaramakrishna	217	26.4	459	182	30.0	479
5	Sri. V. SambasivaRao	237	28.7	423	197	31.6	444
6	Sri. M. SuriBabu	213	34.5	410	181	39.6	442
7	Sri. M.VenkateswaraRao	217	34.3	463	179	35.0	483
8	Sri.V. VenkateswaraRao	237	30.9	444	201	35.7	475
9	Sri. S. Naga Krishna	248	32.8	391	203	35.0	427
10	Sri .U.VenkateswaraRao	250	33.5	439	231	39.1	454
11	Sri. A. SambasivaRao	237	32.7	449	168	37.7	476
12	Smt. K. Dakshnayamma	276	34.6	450	234	34.4	479
13	Sri. K. Syamala Kumar	234	28.4	325	203	34.2	361
14	Sri. D. SrinivasaRao	261	33.0	379	217	38.0	395
15	Sri. S. Edukondalu	248	31.2	364	215	35.4	404
16	Sri. P. Venkateswara Reddy	282	28.4	396	240	33.5	423

Table 4. YearwisePaddyyield in treated and untreatedplots in aquapondfields

Sl.No.	Particulars	Paddy yield (kg ha^{-1})					% yield increase
		Control	2012	2013	2014	Mean	
1	Sri Dasaradharami Reddy	3585	4125	5625	5625	5125	43
2	Sri. Edukondalu	4050	5156	4875	5813	5281	30
3	Smt. UppalaPushpavathi	3950	5063	4688	5063	4938	25
4	Sri. V.Sivaramakrishna	4150	5063	5625	5453	5380	30
5	Sri. V. SambasivaRao	3565	4875	4688	5250	4938	39
6	Sri. M. SuriBabu	4025	5063	4500	4688	4750	18
7	Sri. M.VenkateswaraRao	3580	4313	4313	4500	4375	22
8	Sri.V. VenkateswaraRao	3865	4313	4688	5061	4687	21
9	Sri. S. Naga Krishna	3485	4125	4500	4125	4250	22
10	Sri .U.VenkateswaraRao	4025	5063	3750	4688	4500	12
11	Sri. A. SambasivaRao	3850	4125	4875	4120	4373	14
12	Smt. K. Dakshnayamma	3550	3750	4875	4500	4375	23
13	Sri. K. Syamala Kumar	3348	3938	4875	5070	4628	38
14	Sri. D. SrinivasaRao	3955	4688	5250	4685	4874	23
15	Sri. S. Edukondalu	3865	4688	5438	4880	5002	29
16	Sri. P. Venkateswara Reddy	3565	4125	4500	4688	4438	24

Fig. 2. Abandoned Aqua Ponds

Fig. 3. Establishment of paddy field after reclamation of aqua ponds

These results are in agreement with Mohamed (2012) and Trilok *et al.,* (2012). Prapagar *et al.,* (2012) reported that addition of organic amendments decreased the EC values as a result of organic matter trigged leaching of excessive ions by improving the physical properties of soil.

Sodium Adsorption Ratio (SAR)

Initial soil having SAR values ranged from 14.37 to 27.49 and decreased to 1.68 to 12.94 in final soil analysis. A clear decrease in SAR was observed for chemicalamended soils after leaching. The decrease in SAR due to either increase in divalent cations (Ca^{2+} and Mg^{2+}), or decrease in monovalent cation (Na^{+}). The measured values of cations (Table 2) indicated that Na^{+} decreased while Ca^{2+} increased in the exchangeable complex after the application of organic and inorganic amendments followed by leaching. The relatively high mobility and leachability of Na^{+} from soil due to the applied amendments as compared with Ca^{2+}, resulted in lower values of SAR, hence, the SAR values of the treated soil were sharply decreased with leaching. Prapagar *et al.,* (2012) reported that 100% gypsum applied for the GR was more effective in reducing the SAR than an equivalent amount of Ca Cl_2.

Availability of macronutrients

Initial soil having nitrogen content ranged from 217 to 282 kg ha^{-1} and final soil having 168 to 240 kg ha^{-1}(Table 3). Soil available nitrogen was significantly decreased compared to initial soil analysis, it may be due to losses of nitrogen thorough various methods and removal by crop. Yeresheemi *et al*., (2000) reported that in salt affected soils nitrogen content was decreased due to high pH, Low Organic carbon favouring higher ammonia volatalisation losses and reduced nitrification and subsided activity of N- fixing microbes. Initial soil available phosphorous content ranged from 26.4 to 34.5 kg ha^{-1} and increased to 30.0 to 39.6 kg ha^{-1} in final soil analysis. Initial soil available potassium content ranges from 325 to 463 kg ha^{-1} and increased to 361 to 483 kg ha^{-1} in final soil analysis. This might be due to addition of organic matter improves the availability of nutrients in the soil.

Archana Singh and Jitendra Kumar Singh (2014) reported that application of gypsum significantly influenced the soil available macronutrients such as N, P, K, S and micronutrients (Fe, Cu, Zn and Mn).

Paddy yield

Adoption of reclamation practices, the paddy crop yield increased from 12 to 43 % higher than the control plot after three years of experiment (Fig 3 and Table 4). The dominant ions in exchangeable site are sodium and chlorides. The salts which are accumulated in the pond surface layer, they get dissolved, diluted & drained out through drainage channel. Leaching of soils with gypsum and application of organic manures the EC levels of abondedaquaponds drastically decreased and pH values also get neutralized. Whenever the EC & pH values decreased & neutralized the availability of nutrients are increased & automatically yields are also increased compared to earlier. All the three years recorded higher paddy yields compared to control plot. The three years average highest paddy yield was recorded in Sri. Edukondalu, Gokarnamatam village with 5281kg ha^{-1}. Lower yields were recorded in during 2014 compared to 2012 and 2013 years due to deficit rainfall (40.8%) and tail and area of canal leads to acute hortage of water coupled with aggravated salinity (Figure 1). Increased paddy crop yields, might be due to application of powdered gypsum replaces the sodium ion from exchangeable sites with calcium and removal of soluble salts from rootzone depth through leaching will reduce the SAR values and addition of organic matter through *insitu* green manuring improve the soil physical properties like infiltration rate, water holding capacity and availability of nutrients to the crop. Haq *et al.* (2001), Prapagar *et al. (*2012) and CSSRI annual reports (1998) reported that adoption of package of practices for reclamation of alkali soils gave higher yield over control.

Conclusion

With implementation of reclamation practices developed by CSSRI, Karnal sub centre AICRP on SAS & USW in agriculture, Saline Water Scheme, Bapatla like application of gypsum, (leaching of soluble salts) which are accumulated in the pond surface layer, they get dissolved, diluted & drained out through drainage channel, followed by growing of dhaincha green manure and insitu incorporation. The EC levels of abondedaquaponds were drastically reduced. The soil pH levels also get neutralized. Whenever the EC & pH values decreased & neutralized the availability of nutrients are increased &increased the paddy crop yields from 12 to 43 percent compared to earlier.

REFERENCES

Archana Singh and Jitendra Kumar Singh 2014. Effect of Gypsum on the Reclamation and Soil Chemical Properties in Sodic Soils of Raebareli District, Uttar Pradesh. *International Journal of Scientific Research in Environmental Sciences*, 2(12), pp. 429-434,

Bower, C.A, Reutememerer, R. F and Fireman M. 1952. Exchangablecations analysis of saline and alkaline soils. *Soil Science*, 73; 251-267.

CSSRI- Central Soil Salinity Research Institute. 1998. Biennial Report 1996-98. AICRP on Management of salt affected soils and Use of saline water in *Agriculture*. CSSRI, Karnal, India.138p.

Haq, I.U., Habib, U.R., Niazi, B.H. and Saleem, M. 2001. Effect of horizontal flushing on the reclamation of sodic soils and yield of fodder crops after gypsum application. *Int. J. Agric. Biol*., 3: 323-325.

Jackson, M.L. 1973. Soil chemical analysis. Published by Prentice Hall of India Private Limited, New Delhi.

Mohamed, K.Abdel-Fattah 2012. Role of gypsum and compost in reclaiming saline- sodic soils. *Journal of Agriculture and Veterinary Science,* Vol.(1) : 30-38.

Olsen, S.R., Cole, C.L., Watanabe, F.S. and Dean, D.A. 1954. Estimation of available phosphorus in soils by extraction with sodium bicarbonate. DSDA *Ciro*: No.939.

Prapagar, K., Indraratnel, S.P. and Premanandharajah, P. 2012. Effect of Soil Amendments on Reclamation of Saline-Sodic Soil. *Tropical Agricultural Research* Vol.23 (2): 168-176.

Tandon, H.L.S (Ed). 2006. Methods of Analysis of Soils, Plants, Waters and Fertilisers, Fertiliser Development and Consultation Organisation, New Delhi, India.

Thomas, G.W. 1982. Exchangeable cations. In A.L. Page et al (eds.) Methods of Soil Analysis. Part 2.2nd ed. ASA and SSSA Madison. WI. pp. 159-165.

TrilokNath, R.H, KedarNathRai, S.N. Prasad, C.P. Shrma, S.K. Mishra and B.R. Gupta 2010. Effect of organic amendments, bioinoculants and gypsum on the reclamation and soil chemical properties in sodic soils of Etawah. *Journal of Soil and water Conservation*. Vol(9): 197-200.

Salinity, U.S. and Laboratory Staff 1954. Diagnosis and improvement of saline and alkali soils. USDA Agric. Handb. 60. U.S. Gov. Print. Office, Washington, DC.

Yeresheemi, A.N. Channal H.T., Patagundi, M.S. and Sathyanarayana T. 2000. Macro and micro nutrient status of some salt affected vertisols of upper Krishna Command (Karnataka). Agropedology, 8: 35-40.

****