SUSTAIN RELEASE OF FERTILIZER USING GEOPOLYMER

Ruchi Mohta[1],Dr. Ashit Kumar Saxena [2],Dr. S.S .Amritphale [3],Dr. J.S. chouhan[4]

[1]Researchscholar, Pursuing Master of Engineering (IV SEM), Environmental Engineering, Samrat Ashok Technological Institute, Vidisha.[2] Professor Samrat Ashok Technological Institute Vidisha.[3]Ex Director CSIR –AMPRI R&D Department of Civil Engineering, Samrat Ashok Technological Institute, Vidisha _(M.P.),Director of Samrat ashok technological institute, vidisha (m.p.)[4]

Abstract:-We compare our fertilizer i made release slowly (sustain release) whereas urea melts instantly now we talk about the use of potash as a raw material. I use potash because it is more beneficial than others and of low cost. And the fertilizer i made is also have long life as compare to others (like urea) and also it sustain release the proteins which maintains the soil nutrients.

Also we can reuse the fertilizer even when it is already used once. We do not have to retake the new fertilizer for our next crops. And it is helpful for farmers for better yield of crops.

Keywords:-Sustain release, Flyash, geopolymer, potash fertilizer KOH mixed fertilizer

Introduction:- Geopolymer , an alkaline liquid used to react with silicon in by product material to produced binder. Geopolymerization is a combination of sodium hydroxide or potassium hydroxide and sodium silicate or potassium silicate.. Geopolymer are part of polymer science , chemistry and technology that forms one of the major area of material science .Green alternative to port land cement because of its low carbon footprint. Commercially produced geopolymer may be used for fire and heat resistant coating. The geopolymer has excellent physicochemical and mechanical properties such as high surface hardness , low density ,fire and chemical resistance thus making it a potential material for various application. A major increase in the quantities of agrochemicals used will be necessary to achieve any substantial increase in production of food stuffs. The use of sustain release of fertilizer increase their efficiency reduces nutrients loss and soil toxicity. Thermal power plants industries/wastes containing flyash are used as the raw material to manufacturing potash fertilizer. Any material organic or inorganic, natural or synthetic which supplies one or more of the chemical elements required for the plants growth is called "FERTILIZER.

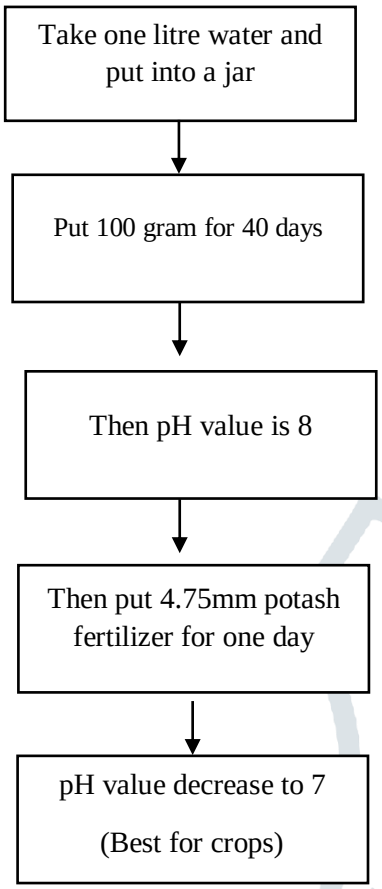
Experimental Procedure:-

- Take all the raw materials required
- Solution of potash, water and sodium silicate except fly ash
- Fly ash and pours the solution slowly in it until i found the slurry
- Dried the slurry in sunlight properly around 8-10 days
- Crushed the material in different sizes of 6.3mm and 4.75mm by the help of sieves
- I had done the two processes-
- Process 1 plant the wheat and saw after 4days, then putted varieties of fertilizers in Process 2, I had done the titration process completely and measure the pH of it
- Compared the values of resulted pH with actual ph.

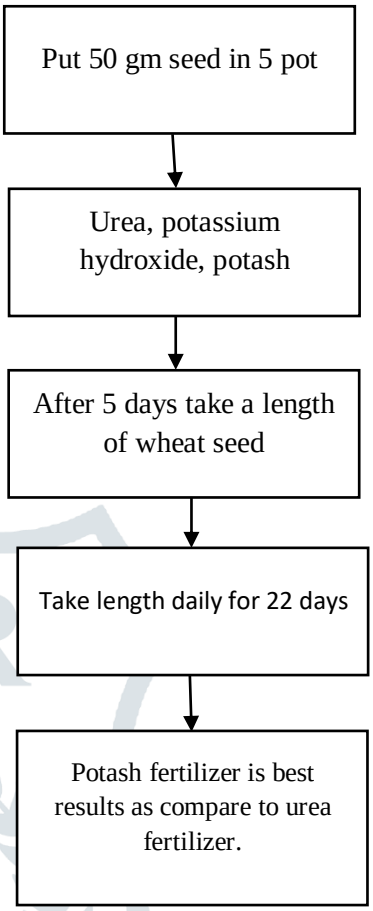
Methodology:-

Material

- Potash
- Sodium Silicate
- Potassium Hydroxide
- Water
- Fly ash



Process 1



Process 2

Height of wheat grass

S.no	Day	Type	Size of fertilizer mm	Height cm
1	1	KOH + Sodium silicate	4.75	6.5
		KOH + Sodium silicate	6.3	7.5
		Potash + Sodium silicate	4.75	8.0
		Potash + Sodium silicate	6.3	7.5
		Urea fertilizer	_	5.0
2	6	KOH + Sodium silicate	4.75	11
		KOH + Sodium silicate	6.3	10
		Potash + Sodium silicate	4.75	16
		Potash + Sodium silicate	6.3	18
		Urea fertilizer	_	9
3	12	KOH + Sodium silicate	4.75	17

		KOH + Sodium silicate	6.3	19
		Potash + Sodium silicate	4.75	29.5
		Potash + Sodium silicate	6.3	28.5
4	22	KOH + Sodium silicate	6.3	20
		Potash + Sodium Silicate	4.75	36.5
		Urea fertilizer	_	20

Potash mixed fertilizer

S.No	Day	Size(mm)	Reading (ml)	pH
1	1	4.75	10.5	8.0
		6.3	12.6	7.5
2	10	4.75	5.6	8.0
		6.3	6.9	7.5
3	20	4.75	5.0	7.5
		6.3	5.1	7.5
4	30	4.75	3.0	7.5
		6.3	3.3	7.0

KOH MIX FERTILIZERS :-

S.No	Day	Size(mm)	Reading (ml)	pH
1	1	4.75	26.5	13
		6.3	25.5	13
2	10	4.75	25.0	11
		6.3	24.0	12
3	20	4.75	15.2	10
		6.3	16.2	11
4	30	4.75	4.9	9.5
		6.3	5.1	9.5

RESULTS :-

The mixture of potash and geopolymer at room temperature is resulted very productive because this fertilizer can be used at any temperature whereas popular fertilizer such as urea can be used below 60°F. The resulted fertilizer is economic as compared to urea. Although its initial cost is high but overall very economical. It will never destroyed(melts) till one year(approx..) because its geopolymeric material whereas urea melts instantly because it react with water easily.Now where we compare the pH value of our fertilizer with other fertilizer we get the value of Ph are neutral (7-8) i.e. It's very beneficial for the crops and also this fertilizer maintain the pH value of soil.

When we compare the lengh of grasses of without fertilizer resulted fertilizer and urea we found the length of grasses is more of resulted fertilizer as compared to both of them.

Differences of fertilizer

S.no	Parameters	Potash mixed fertilizer	Koh Mixed fertilizer	Urea fertilizer
1	Chemical name	Muriatic of potash [KCL]	Potassium hydroxide [KOH	Carbamide [NH2CONH2]
2	Raw material	Potash + flyash + sodium silicate + water	KOH + flyash + sodium silicate + water	Ammonia + carbon dioxide
3	Nutrients	Increase in Nutrients	Decrease in nutrients	It enhance miming of soil nutrients that are not applied inadequatey
4	Toxicity	No toxicity	Increase in toxicity	Toxic and hazardous to skin
5	Quality	If Ph is neutral is good for food's	If pH increase when it's food's pH is too high	Low pH are not good
6	Moisture absorber	No	No	highly
7	Nitrogen	There is No Nitrogen	There is No Nitrogen	High level of nitrogen in the water can create algae. Large growth of algae that imbalance the ecosystem
8	pollution	No pollutants release during process	No pollutants release during process	Urea release harmful pollutants during its manufacturing process

Conclusion: Solution, pH 7–8. The K might form a complete chemical bond preserved in ash particles for a long time in the field. Residual K impregnated in fly ash after washing was quantitatively analyzed as a function of concentration of KOH solution. the variation of residue for respective cases including sintering process and without it. As expected, higher concentration of the solution resulted in more residual K contents for a sufficient reaction time.. In contrast, the sintered samples contained more absolute residual K elements and were less affected by reaction temperature. Thus, it can be said that the sintering must be a core process for the preparation of ash fertilizer. For instance, under 6N KOH at 120 °C reaction, the impregnated amount of K2O, which is the basis for expressing the K contribution in a fertilizer, was 5.18 g out of 20 g ash pellets. Among them, about 24% (1.4 g) remained after washings and leaching tests. In other words, approximately 76% of K2O was released through more than 40 washings, and the other 24% did not disappear even by further washings. Detailed scientific analysis to verify the reinforcing mechanism of uptake of the K elements in the ash particles was not performed in this work. Further peer studies and experiments must be conducted to investigate the condition of the soil and the type of crops.

References:-

-] B. Azeem , K. KuShaari , Z. B. Man, A. Basit , and T. H. Thanh , "Review on materials &methods to produce controlled release coated urea fertilizer," J Control Release, vol. 181, pp. 11-21, 2014.
- [3] A. Shaviv , "Controlled release fertilizers," presented at the IFA International Workshop on Enhanced-Efficiency Fertilizers, Frankfurt, 2005.
- [4] N. I. F. Zulkefely , "Effect Of Nanofillers On The Spreading Behaviour Of Biopolymer Blends On Urea Surface," 2013.
- [5] W. Stewart, D. Dibb , A. Johnston, and T. Smyth, "The contribution of commercial fertilizer nutrients to food production," Agronomy Journal, vol. 97, pp. 1-6, 2005.
- [6] K. Nelson, P. Scharf , L. Bundy, and P. Tracy, "Agricultural management of enhanced-efficiency fertilizers in the north-central United States," Crop Management, vol.
- 7, pp. 0-0, 2008. [7] G. M. Blouin and D. W. Rindt , "Method of making sulfur-coated fertilizer pellet having a controlled dissolution rate," ed: Google Patents, 1967.

- [8] P. Esker, R. Shaver, J. Leverich , M. Ballweg , P. Hoffman, and M. Rankin, "2009-2010 Dairy Cattle Feeding Issues with High-Moisture Corn , Snaplage and Dry Shelled Corn.
- " [9] L. Chen, Z. Xie, X. Zhuang , X. Chen, and X. Jing, "Controlled release of urea encapsulated by starch-g-poly (L-lactide) ," Carbohydrate polymers, vol. 72, pp. 342-348, 2008.
- [10] N. Z. Zulhaimi , K. KuShaari , and Z. Man, "Characterization of chemically modified biomass as a coating material for controlled released urea by contact angle measurement," World Acad. Sci. Eng. Technology, vol. 5, pp. 395-399, 2011
- Image reference by google.