International Journal of Academic Research
ISSN: 2348-7666 : Vol.2, Issue-4(4), October-December, 2015
Impact Factor : 1.855

Study on the influence of Marine Algae Properties by using in Concrete

Pagoti Sireesha, Student of M.Tech in Civil Engineering Department with specialization in Structural engineering.

N.Vidyasagar lal, Assist professor, Department of Civil Engineering in Gokul Institute of Technology and Sciences,Bobbili, Vzm

Abstract: *Study of marine algae has started,because of chemical reaction with cement and the environment gets free from pollute and therefore the introduction of algae in concrete can control these harmful reaction. Since algae is environmental friendly. This makes the concrete more economic and, at the same time, there is a reduction of the problem of the waste. In this paper marine brown algae is added in to concrete in wet form to find out the compression, split tensile, slump cone, compaction factor and shrinkage test with 5%, 10%, and 15% of marine brown algae with different grade of concrete. In which 15% of marine brown algae seen to be predominate from remaining percentage. By comparison, wet form of marine brown algae has good homogeneous mix and improvement of strength in all tests.*
Keyword: *Marine brown algae, Compression Test, Split Tensile Test, Shrinkage Test*

Introduction:

Concrete based on Portland cement is the most widely used construction material in the world, and its production follows a trend of growth. In 2011, the world production of Portland cement reached $2.8x10^9$ tones and is expected to increase around $4x10^9$ tones for the 2050. About 15% of the total concrete production contains chemical admixtures, which are chemicals added to concrete, mortar or grout at the time of mixing to modify their properties, either in fresh or hardened state.

Algae are photosynthetic aquatic plants that utilize inorganic nutrients such as nitrogen and phosphorus. The Phaeophyceae or brown algae (singular: *alga*), is a large group of mostly marine multicellular algae, including many seaweeds. Worldwide there are about 1500–2000 species of brown algae Some species are of sufficient commercial importance, such as Ascophyllum nodosum, that they have become subjects of extensive research in their own right. Most brown algae contain the pigment fucoxanthin, which is responsible for the distinctive greenish brown color that gives them their name. Genetic studies show their closest relatives to be the yellow green algae. Brown algae exist in a wide range of sizes and forms. The smallest members of the group grow as tiny, feathery tufts of threadlike cells no more than a few centimeters long. Some species have a stage in their life cycle that consists of only a few cells, making the entire alga microscopic. Other groups of brown algae grow too much larger sizes. Used as fertilizer, energy source, food source, for pigments, pollution control, and medicinal purposes whatever their form, the body of all brown algae is termed the all us, indicating that it lacks the complex xylem and phloem of vascular plants. This does not mean that brown algae completely lack specialized structures. But, because some botanists define "true" stems, leaves, and roots by the presence of these tissues, their absence in the brown algae means that the stem like and leaf like structures found in some groups of brown algae must be described using different terminology. Although not all brown algae are structurally complex, those that are typically possess one or more characteristic parts.

2. Discussions and test results:

2.1. Compressive strength: The compressive strength of wet marine brown algae concrete increased by 4% when compared with conventional concrete conventional concrete. Cube size 15x15x15mm diameter .Testing is shown in Fig.1and2. The results are presented in Table.1and2.comparison is shown in below fig.

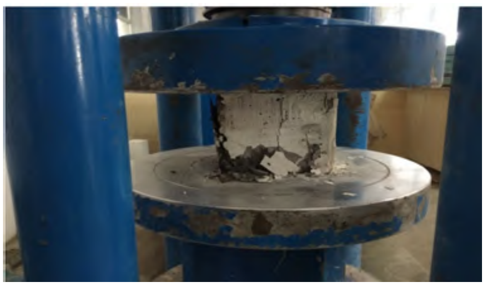

Fig.1

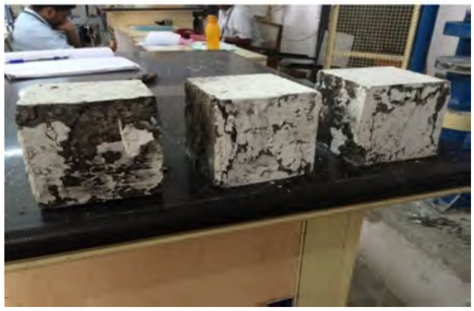

Fig.2

2.2Split tensile strength: Splitting tensile strength of wet marine brown algae concrete increased by 7.43N/mm² (8.01% of compressive strength), conventional concrete is 5.98 N/mm².cylinder size 100x200mm diameter. Testing is shown in Fig.3. The results are presented in Table.3 and 4. The comparison is shown in below Fig.11.

Fig.3

2.3 Shrinkage test:

The Shrinkage cracks such as shown in our photograph below are found in poured concrete, are easily recognizable, and can be distinguished from other types of cracks that occur later in the life of a floor slab. The size of the slab 850x540x250 mm diameter 15% of wet marine brown algae is having greater strength and the percentage of wet marine brown algae concrete+cement+sand is chosen to conduct shrinkage test.Testing is shown in below fig.4

Fig.4

Table No: 1 Conventional concrete for compression Test

S.No	Type of concrete	Compression Test (N/mm^2)		
		3 Days	7 Days	28 Days
1	M25	25.04	28.74	33.3
2	M35	26.50	33.12	42.8
3	M40	27.50	34.72	47.48

Table No.2 Compression Test values of Wet Marine Brown Algae.

S. NO	Type of concrete	3 Days			7 Days			28 Days		
		5%	10%	15%	5%	10%	15%	5%	10%	15%
1	M25	24.9	25.1	23.01	26.4	28.7	26.7	29.3	30.9	31.2
2	M35	25.1	26.12	29.71	30.39	33.9	35.14	40.61	41.6	47.92
3	M40	26.5	28.1	30.79	34.1	35.4	39.71	46.7	49.4	55.72

Table No: 3 Conventional concrete for Spilt Tensile Test

S.No	Type of concrete	Split Tensile Test (N/mm^2)		
		3 Days	7 Days	28 Days
1	M25	2.31	2.68	3.39
2	M35	3.31	4.01	5.12
3	M40	3.79	4.34	5.98

Table No:4 Split tensile test for Wet Marine Brown Algae

S. NO	Type of concrete	3 Days			7 Days			28 Days		
		5%	10%	15%	5%	10%	15%	5%	10%	15%
1	M25	2.3	2.57	2.33	2.58	2.33	2.9	3.1	3.12	3.15
2	M35	3.1	3.57	3.5	3.9	4.5	4.70	3.79	5.12	5.5
3	M40	3.12	3.63	4.43	4.1	4.52	5.5	4.70	5.70	7.43

Compression Test: The compression strength wet and conventional concrete comparison is shown in Fig.7, and 8

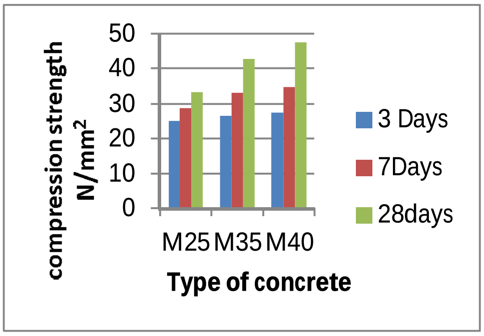

Fig.7 Conventional concrete

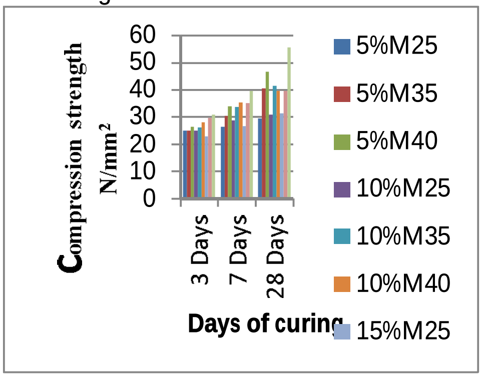

Fig.8 wet marine brown algae

Split tensile test:

The strength comparison to the Wet marine brown algae concrete and conventional concrete. Is shown in the Fig.9and 10

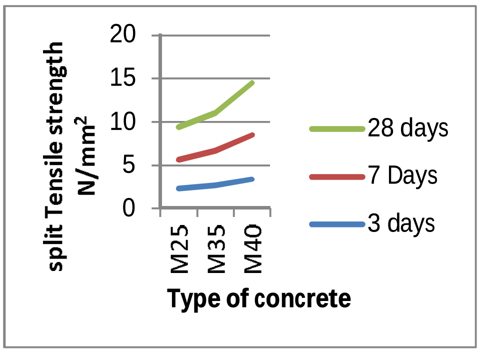

Fig.9 conventional concrete

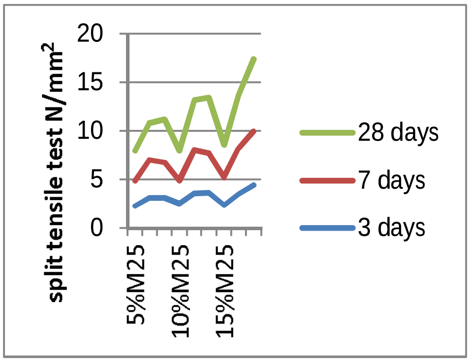

Fig.12 wet marine brown algae.

Conclusion:

The following conclusions can be drawn from the experimental investigation carried out.

1. ALG increases the air content in the mixture due to its protein content, being in some cases >6%.
2. The slump test of wet marine brown algae is 2% more than the conventional concrete.
3. The compaction factor test of wet marine brown algae is 1.5% more than the conventional concrete.
4. 15% of Wet Marine Brown algae more compressive strength than conventional concrete.
5. The compressive strength of the concrete reduced with increasing percentage of the Wet Marine Brown algae replacement.
6. The cube compressive strength of concrete at the age of 3,7&28 days resulted in marginal reduction with 15% Wet Marine Brown algae.
7. The Split Tensile strength at 28days was reduced by Wet Marine Brown algae when compared with conventional concrete.
8. The shrinkage test is 15% of wet marine brown algae concrete is having

greater strength of conventional concrete.

9. The wet marine brown algae concrete is preferable since the strength property is more than dry condition.

10. The strength of wet marine brown algae was 55.76 N/mm^2 for 28 days of M40 grade of concrete.

11. The wet marine brown algae concrete strength was 7.43 N/mm^2 for 28 days of split tensile test of M40 grade of concrete.

References:

[1]. Neville, A.M., "Properties of Concrete", (1973), Publishers the English language book society; pp-629-632.

[2]. Majid Ali, "Coconut Fiber – A Versatile Material and its Applications in Engineering" (2010), University polytecnical delle Marche, Ancona, Italy

[3]. Malhotra, V.M., "No –fines concrete its properties and applications", (1976), journal of American Concrete Institute, title no. 73-54, Nov., pp-628-644.

[4] Schneider M, Romer M, Tschudin M, Bolio H. Sustainable cement production presentand future. Cem Concr Res 2011;41(7):642–50.

[5] Plank J. Applications of biopolymers and other biotechnological products in Building materials. Appl Microbiol Biotechnol 2004;66(1):1–9.

[6] Dransfield J. Admixtures for concrete, mortar and grout. In: Newman J, Choo BS, editors. Advanced concrete technology, constituent materials. Oxford: Butterworth-Heinemann; 2003.

[7] Nanthagopalan P, Santhanam M. A new empirical test method for the Optimization of viscosity modifying agent dosage in self-compacting concrete. Mater Struct 2010;43:203–12.

[8] Okamura H, Ouchi M. Self-compacting concrete.J Adv ConcrTechnol2003;1(1):515.

[9] Gaimster R, Dixon N. Self-compacting concrete. In: Newman J, Choo BS, editors. Advanced concrete technology, processes. Oxford: Butterworth-Heinemann;2003.

[10] Łaz´niewska-Piekarczyk B. The influence of selected new generation admixtures on the workability, air-voids parameters and frost-resistance of self-compacting concrete. Constr Build Mater 2012;31:310–9

[11] Collepardi M. Admixtures used to enhance placing characteristics of concrete. Cem Concr Compos 1998;20(2–3):103–12.

[12]. ACI committee 212, Admixtures for concrete, (1963), Journal of ACI. Vol. 60, pp.1481- 1524.

[13]. Mannan. M. A and Ganapathy .C, "Engineering properties of concrete with oil palm shell as coarse aggregate", (2002), International Journal of Construction and Building Materials, pp. 29-34.

[14]. IS 10262 – 1982: Recommended guide lines for concrete mix design, Indian standard institution, New Delhi.