AN EXPERIMENTAL INVESTIGATION OF CONCRETE PAVEMENT BY PARTIAL REPLACEMENT OF FINE AGGREGATE & CEMENT BY PEBBLE STONES POWDER & PROSOPIS JULIFLORA ASH

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***ABSTRACT** Concrete is very commonly used as construction materials in every projects With the growth in rural, urban and industrialization and its value is increased day by day. In order to reduce the negative impact of concrete pavements. The use of waste materials in our project deals with the partial replacement of fine aggregate and cement by pebble stone powder and prosopis juliflora ash. The substituent to fine aggregate and cement by pebble stones powder and juliflora ash at a level 10%, 20%, 30% is to be studied for masteries and strength properties 100% cement concrete mix of M20 and watet cement ratio 0.45 As per Indian standards.The strength will be tested during the period of 7 days, 14 days & 28 days respectively. We will compare the replace concrete will be conventional concrete about the strength and durability of the concrete. As the amount of cement is reduce green house gases also reduced. The utilization of juliflora ash as a partially replacement in cement is one of the promising method to increase the strength & thermal insulation for cement concrete works. In now-a-days fine aggregate plays a major role in the preparation of any kind of mortar and concrete in construction work. In general we are widely using the quarry sand [Manufactured sand] has as an alternative for natural sand.In this project we used the crushed pebbles as a sand. Which is produced by crushing the pebbles is one of the alternative material. In that the crushed pebble stone used as a fine aggregate partial replacement at the same percentage of 10%, 20% &30% respectively.In the experimental study of strength characteristics of concrete using juliflora ash cement & crushed pebbles as a fine aggregate. It is find that the compressive Strength of concrete.*

1. INTRODUCTION

Concrete is the most broadly perceived material used as a component of construction industry in which cement assumes to have a critical part in the production of concrete. In the production of cement equivalent amount of CO2 is emitted into the atmosphere which results in environmental pollution. India lies second only to China in the production of cement annually results in the requirement of alternative to cement in the production of concrete. Various literatures addressed the mechanical and durability properties of concrete utilizing natural by-products such as juliflora ash. Prosopis juliflora, a persistent weed has been broadly spread over the past 150 years, belongs to a family of Leguminosae has been an environmental concern in various parts of the globe including India; consequently, expulsion of it in mass has been occurring in various parts. It is a nitrogen fixing plant which can even grow in any conditions of environment does not depend on any environmental features. It is termed as exogenous species which can have a growth of around 2.5 tons of wood/ ha/year even under arid and drought condition. Prosopis invasion be likely to form thick, impervious bushes, related with ominous effects on human monetary exercises.

In Tamil Nadu, a southern state of India has proposed a policy to encourage the removal of this species from the uncultivated land. It is right now being utilized in the production of power in small scale by firing along with coal. Since, no work has been addressed on the utilization of Prosopis juliflora ash in the production of cement concrete, this work was intended to evaluate the use of PJA as partial replacement of cement in the production of cement concrete. This will result in the reduction in the growth of Prosopis juliflora thereby reduction in the loss of groundwater and also effectively utilizing the PJA in mass production.

Development of cement and fine aggregate partial replacement with juliflora ash & pebble stone powder in concrete: However, recently the ordinary Portland cement has been no longer manufactured in Indonesia except upon special request. To date, the cements that are still produced are Portland pozzolan cement and Portland composite cement, which certainly has different characteristics compare to that of ordinary Portland

cement. In this study, the Portland composite cement is used. The purpose of this study is to determine the compressive strength of concrete with juliflora as cement replacement in concrete

Pebble Stone powder produced from stone crushing zones appears as a problem for effective disposal. Sand is a common fine aggregate used in construction work as a fine aggregate. In this study, the main concern is to find an alternative of sand. Substitution of normal sand by stone powder will serve both solid waste minimization and waste recovery. The study focuses to determine the relative performance of concrete by using powder sand.

Benefits and Advantages of cement and fine aggregate partial replacement with juliflora ash & pebble stone powder in concrete:

Use of juliflora ash as partial replacement of Sand is Eco-friendly drive. Juliflora ash acts as filler material as well as bonding agent as it shows the bonding property also.Use of juliflora ash in concrete can save the thermal industry disposal costs and produce a 'greener' concrete –for construction. Environmental effects from wastes and residual amount of cement manufacturing can be reduced through this way.Juliflora ash can be use to form various higher concrete grades. The cement content can be reduced a lot by increasing the fly ash content to make it more economical and also we can.Achieve designed compressive strength. Use of juliflora ash is good Option for opc cement.Manufacturing of cement mortar also possible.The cement content can be reduced a lot by increasing the fly ash content to make it less economical and also we can achieve designed compressive strength.The quantity of juliflora ash is available at any kind of environmental it will be grown at free of cost.It is easy to investigate the properties of juliflora ash. When juliflora ash is used in brick construction the compressive strength of brick is increase with increase in lime content.

2.LITERATURE REVIEW

The Concrete is heavily used as construction materials in Modern society. With the growth in urbanization and industrialization and its demand is increased day by days. In order to minimize the negative impact of concrete, the use of waste materials. Our project deals with the partial replacement of coarse aggregate and cement by sea shell and prosopis juliflora ash. As the suggest, juliflora ash used in ingredient of concrete decrease the cement & decrease the cost of construction. Juliflora ash used in concrete ingredient behaves like conventional concrete. So we suggest juliflora ash uses in concrete ingredient. This offers many benefits and advantages over conventional concrete.

Parthiban Kathirvel, George Amal Anik, Saravana Raja Mohan Kaliyaperumal (2019): This presents the mechanical and micro structural characteristics of cement concrete with partial replacement of cement with Prosopis juliflora ash (PJA). The fresh property of the mixes was assessed with the help of slump cone test and the mechanical properties such as compressive strength, impact resistance and flexural characteristics of reinforced concrete beams were assessed. From the experimental investigation, it was observed that there were no such appreciable changes in the mechanical properties of the cement concrete when cement is partially replaced with PJA and 20% replacement produces similar mechanical properties of the conventional cement concrete mixes. This results in greater reduction of loss of groundwater due to the growth of PJA as well as reduction in the pollution rate due to effective utilization of PJA and reduced cement production.

The effect of replacing cement with Prosopis juliflora ash (PJA) on the fresh, strength and flexural properties of cement concrete were experimentally evaluated and the results were substantiated with the micro structural analysis in the form of XRD and SEM. From the experimental and micro structural analysis, the following conclusions can be drawn:

1. Prosopis juliflora ash can be effectively used up to 20% replacement level of cement in the production of concrete, increasing which leads to the delayed ettringite formation due to the higher amount of SO3 content in PJA which may also hinder the alite formation.

2. PJA cannot be used as a replacement for cement at higher levels due to the higher amount of alkalis present in PJA which exceeds the limitation of IS standards.

3. The reduction in the mechanical properties at higher replacement level of OPC with PJA is mainly owing to the formation of Plazolite and its increased intensity at higher replacement levels.
4. The crack widths under impact loading was found to be more at 7 days curing than 28 days curing and increases with the increasing volume of PJA.
5. There is a reduction in the expansion of the mixes with the increasing volume of PJA due to the limited free MgO available in PJA, which in turn results in improved ductility properties of the reinforced concrete beams.

Research work on Experimental investigation of concrete in partial replacement of coarse aggregate and cement by sea shells andprosopis juliflora Ash.

K.P.Ravikumar, M.Karuppiah (2018) : The Concrete is heavily used as construction materials in Modern society. With the growth in urbanization and industrialization and its demand is increased day by days. In order to minimize the negative impact of concrete, the use of waste materials. Our project deals with the partial replacement of coarse aggregate and cement by sea shell and prosopis juliflora ash. The substituent to coarse aggregate and cement by sea shell and prosopis juliflora ash at level of 10%, 20% and 30% is to be studied for masteries and strength properties 100% cement concrete mix is of M25 and water cement ratio is 0.48.the strength will be tested during the period of 7 days 14 day 28 days respective. We will compare the replace concrete with the conventional concrete about the strength and durability of the concrete.

The chemical makeup of these shells demonstrates strength properties that will help bind and strengthen concrete when added as aggregate. This chemical makeup is specifically focused on the calcium carbonate (CaCO3), which makes up 95% of the shell (Yoon, 2002). If the shell strength could be put to use instead of waste, then it would greatly diminish the seafood industries impact on the environment, while simultaneously stimulating the construction industry. Due to the physical and chemical properties of conch and oyster shells, they may be a suitable substitute for aggregates. The crushed shells would be beneficial to the waste industry along with the construction industry. When the shells get crushed they can be substituted for all different types of aggregates depending on the size of the specimen.

3 METHODOLOGY

The evaluation of juliflora ash & pebble stone powder for use as a partial replacement of cement and fine aggregate material begins with the concrete testing. The study is conducted to analyze the compressive strength of concrete when the base materials, i.e. Cement and fine aggregate is replaced with juliflora ash respectively. Compressive strength tests were done on compression testing machine using cube samples. Three samples per different proportions were tested with the average strength values reported in this paper. The juliflora ash replacement with cement was kept at 10%, 20%, 30%, by weight of M 20 grade concrete. Similarly, pebble stone powder is also kept at 10%, 20%, 30%, replacement in both cement and fine aggregate. In all total 27 cubes of OPC (150mm * 150mm *150mm) were examined and results were analyzed after 28 days. Information obtained from the replacement is compared with data from a 9 cubes of Conventional concrete.

4 JULIFLORA ASH AS PARTIAL REPLACEMENT IN CEMENT

Juliflora ash is one type of pozzolanic material is used in partial replacement in cement in construction works as well as road pavements. Juliflora ash means it is one of the material used as cement after the burning the prosopis juliflora tree the ash will be present. Hence effective utilization of Juliflora ash as constituent in various constructions encourage the large scale utilization of wood waste, facilitating human habitation, replacing fast depleting natural resource, so as to contribute to sustainable construction and also helps in conserving the growing tree's contributing to environmental and ecological benefits.Concrete is the most broadly perceived material used as a component of construction industry in which cement assumes to have a

critical part in the production of concrete. In the production of cement equivalent amount of carbon dioxide is emitted into the atmosphere which results in environmental pollution. India lies second only to China in the production of cement annually results in the requirement of alternative to cement in the production of concrete. Various literatures addressed the mechanical and durability properties of concrete utilizing industrial byproducts such as fly ash, slag, silica fume met kaolin, rice husk ash as a partial replacement of cement Still the research tends to identify innovative and the waste materials which can be effectively utilized as a replacement for cement in concrete production. Prosopis juliflora, a persistent weed has been broadly spread over the past 150 years, belongs to a family of Leguminosae has been an environmental concern in various parts of the globe including India; consequently, expulsion of it in mass has been occurring in various parts . It is a nitrogen fixing plant which can even grow in any conditions of environment does not depend on any environmental features. It is termed as exogenous species which can have a growth of around 2.5 tons of wood/ha/year even under arid and drought condition Prosopis invasion be likely to form thick, impervious bushes, related with ominous effects on human monetary exercises. Already invaded in millions of hectares of Rangeland, and the progression is as yet happening in South Africa, Australia and coastal areas of Asia Already it has been intruded in northern Sudan where the Gash Delta of the Atbara River has been totally taken over by Prosopis juliflora . It is one of the three top need intrusive species in Ethiopia and has been pronounced it a harmful weed. Sudan has passed a law to destroy it. It has estimated that the growth of it had reduced the mean annual run off by 481 Mm3 in South Africa Felker has estimated the production of 630,000.

Juliflora ash as partial replacement in cement concrete. It can decrease construction cost and it can be used this type of concrete same as conventional concrete. Juliflora ash can be used in construction decrease the cost of construction. Juliflora ash is nothing but fly ash it can semi combustible coal particles present, they can be removal by sieving by using the pozzolanic material in cement. This type of concrete is not require any other equipment and skilled labor because same as conventional concrete. This type concrete can be used to decrease the air and land pollution in disposal of juliflora ash and protect the natural resources in our environmental.

It is also very important to study the effect of this partial replacement of cement on concrete, to find the optimum replacement of cement. Therefore the study of properties of concrete with different proportion of replacement of cement by juliflora ash is covered in this project work. It is not just the study of concrete but also one eco friendly drive to Juliflora ash, because by using juliflora ash in concrete we are not going to disturb environment any way.

- Prosopis juliflora ash is the residue powder left after the combustion of wood, such as burning wood in a home fireplace or an industrial power plant.
- Prosopis Juliflora Ash from the biomass power plant unit in the state of Tamilnadu, India was selected to evaluate its suitability as ash for OPC replacement.
- PJA was obtained by heating of prosopis juliflora acquired from nearby agricultural field at certain temperature.
- The material was dried and carefully homogenized. An adequate wood ash particle size was obtained by mixing wood ash and cement together for a fixed amount of time.

Prosopis juliflora

Dried Prosopis juliflora tree

Burning of Prosopis juliflora tree

Juliflora ash

MATERIALS & PROPERTIES:

The materials used in this type of concrete same as conventional concrete.

- Cement
- Juliflora ash
- Pebbles stone powder
- Fine Aggregates
- Coarse Aggregates
- Water

TESTS:

To determine physical properties to conduct tests as given below for our research work

- Fineness test
- Specific gravity test
- Normal Consistency test
- Initial and final setting time

INITIAL & FINAL SETTING TIME :

PROCEDURE:

1. Prepare a neat cement paste by gauging 300 gms of cement with 0.85 times the water required to give a paste of standard consistency.
2. Potable or distilled water shall be used in preparing the paste.
3. The paste shall be gauged in the manner and under the condition prescribed in determination of consistency of standard cement paste.
4. Start a stop watch at the instant when water is added to the cement.0
5. Fill the mould with the cement paste gauged as above the mould resting on a nonporous plate.
6. Fill the mould completely and smooth off the surface of the paste making it level with the top of the mould.
7. The cement block thus prepared in the mould is the test block.

DETERMINATION OF INITIAL SETTING TIME:

1. Place the test blocks confined in the mould and rest it on the non porous plate, under the rod bearing initial setting needle, lower the needle gently in contact with the surface of the test block and quickly release, allowing it to the test block.
2. In the beginning, the needle will completely pierce the test block.
3. Repeat this procedure until the needle, when brought in contact with the test block and released as described above, fails to pierce the block to a point 5 to 7 mm measured from the bottom of the mould shall be the initial setting time.

DETERMINATION OF FINAL SETTING TIME:

1. Replace the needle of the vicat apparatus by the needle with an annular attachment.
2. The cement shall be considered as finally set when, up on applying the needle gently to the surface of the test block, the needle makes an impression there on, while the attachment fails to do so.
3. The period elapsed between the time when water is added to the cement and the time at which the needle makes an impression on the surface of test block while the attachment fails to do so shall be the final setting time.

5. PEBBLE STONE POWDER AS PARTIAL REPLACEMENT IN FINE AGGREGATE

INTRODUCTION : Cement is a composite material which is widely used in all over the world. The strength of concrete depending upon the characteristic of materials like cement, fine aggregate, coarse aggregate, admixtures, water. Fine aggregate is the most important ingredient of concrete that the requirement is increasing day by day, but the source is low. A pebble is the part of river sand, but it couldn't use as fine aggregate for the reason of large size. We have an idea to use crushed pebbles as fine aggregate.Pebble is a rock fragment which is smaller than a cobble. They are rounded and/or elliptical in shape, having diameter between 10mm to 150 mm. Due to erosion effect these rock fragments gets naturally tumbled with flowing river water from mountains towards planes, making its surface smooth. A beach composed chiefly of surface pebbles is commonly termed a shingle beach.This type of beach has armoring characteristics with respect to wave erosion, as well as ecological niches that provide habitat for animals and plants. Inshore banks of shingle (large quantities of pebbles) exist in some locations, such as the entrance to the River Ore, where the moving banks of shingle give notable navigational challenges.Pebbles come in various colors and textures and can have streaks, known as veins, of quartz or other minerals. Pebbles are mostly smooth but, dependent on how frequently they come in contact with the sea; they can have marks of contact with other rocks or other pebbles. Pebbles left above the high water mark may have growths of organisms such as lichen on them, signifying the lack of contact with seawater.Pebbles come in various colors and textures and can have streaks, known as veins, of quartz or other minerals. Pebbles are mostly smooth but, dependent on how frequently they come in contact with the sea; they can have marks of contact with other rocks or other pebbles. Pebbles left above the high water mark may have growths of organisms such as lichen on them, signifying the lack of contact with seawater.

6. MIX DESIGN

METHODOLOGY ADOPTED FOR MIX DESIGN

Mix design is a process of selecting suitable ingredients for concrete and determining their proportions which would produce, as economically as possible, a concrete that satisfies the job requirements. The proportioning of the ingredients of concrete is an important phase of concrete technology as it ensures quality and economy. In pursuit of the goal of obtaining concrete with desired performance characteristics, the selection of component materials is the first step, the next step is a process called mix design by which one arrives at the right combination of the ingredients. There are many methods of designing concrete mixes.

Design of Concrete Mix:-

The compressive strength of concrete is considered as the index of its quality. Therefore the mix design is generally carried out for a particular compressive strength of concrete with adequate workability so that the fresh concrete can be properly mixed, placed and compacted. The proportions for the mix were calculated adopting the requirements of water as specified in BIS: 10262-1982.

The proportioning of concrete mixes consists of three interrelated steps.

(i) Selection of suitable ingredients-cement, aggregates, water.

(ii) Determination of the relative quantities of these materials in order to produce as economically as possible a concrete, that has desired rheological properties i.e. strength and durability.

(iii) Careful quality control of every phase of the concrete makingprocess.

In the present study Mix Design for M20 (Design value at the age of 28 days) and M30 (Design value at the age of 28 days) grade concrete is done according to BIS: 10262- 1982**.**

7 EXPERIMENTAL STUDY

INTRODUCTION:-

This chapter describes the materials used, the preparation of the test specimens and also, the properties and chemical composition were listed down in this section.

In order to achieve the stated objectives, this study was carried out in few stages. On the initial stage, all the materials and equipments needed must be gathered or checked for availability. Then, the optimum calculations temperature was determined. Juliflora ash as partial replacement of natural sand and cement samples were tested through concrete tests such as cube test. Finally, the results obtained were analyzed to draw out conclusion. Preparing specimens for testing on compressive strength on concrete by replacing of juliflora ash by cement.

Material used for juliflora ash Portland cement concrete:

These materials used in this study were cement, juliflora ash, sand (fine aggregate), pebble stone powder, coarse aggregate and water. The description of each of the material is described in the following sections.

Cement:

- Cement used this study was KCP brand ordinary Portland cement of grade 43.The cement was kept in an airtight container and sorted in the humidity controlled room to prevent cement from being exposed to moisture, which conforming to IS 12269:1987.
- Cement is a binder, substances used for construction that sets, harden, and adheres to other materials to bind them together. Cement is seldom used its own, but rather to bind sand and gravel together. Cement mixed with fine aggregate produces mortar for masonry, or with sand and gravel, produces concrete. Cement is the most widely used material in existence.
- Tricalcium silicate (C3S) hardens rapidly and is largely responsible for initial set and early strength.
- In general, the early strength of port land cement concrete is higher with increased percentages of C3S.
- Di calcium Silicate (C2S) hardens slowly and contributes largely to strength increases at ages beyond 7 days.
- Tricalcium Aluminate (C3A) liberates a large amount of heat during the first few days of hardening and, together with C3S and C2S may somewhat increase the early strength of the hardening cement (this effect being due to the considerable heat of hydration that this compound evolves). It does affect set times.
- Tetra calcium Alumino ferrite (C4AF) contributes very slightly to strength gain. However, acts as a flux during manufacturing. Contributes to the color effects that makes cement gray.
- The chemical composition of the ordinary Portland cement was taken from as per IS: 12269-1987 is given in the Table

8. CASTING OF SPECIMENS

1. Partial replacement of cement & fine aggregate with juliflora ash & pebble stone powder.
2. When we casting a specimen for testing a compressive strength in that way we replace a cement with juliflora ash and fine aggregate with pebble stone powder.
3. Weight the quantities of cement, fine aggregate, coarse aggregate, juliflora ash, pebble stone powder, & water for one batch of concrete, to an accuracy of 0.1% of the total weight of batch.
4. Mix the concrete by hand or preferably in laboratory batch mixer avoiding loss of any material or water. The period of mixing should not be less than two minutes after adding all materials in drum, in

case machine mixing.

5. In the case of hand mixing first mix cement and fine aggregate until a uniformly add coarse aggregate to the earlier mix and mix all materials are uniformly spread throughout the batch. Add water and mix the entire batch until the all materials are uniformly concrete appears to be homogenous and attain the required consistency.

6. Apply a thin coat of oil to the base plate and interior faces of the moulds, prevent adhesion of concrete. Then we partial replacement of cement and fine aggregate with juliflora ash &pebble stone powder at certain manner with respective mix design

7. The substituent to fine aggregate and cement by pebble stones powder and juliflora ash at a level 10%, 20%, 30% is to be studied for masteries and strength properties 100% cement concrete mix of m20 and water cement ratio 0.45 As per Indian standards.

8. The strength will be tested during the period of 7 days, 14 days & 28 days respectively. We will compare the replace concrete will be conventional concrete about the strength and durability of the concrete. As the amount of cement is reduce green house gases also reduced. The utilization of juliflora ash as a partially replacement in cement is one of the promising method to increase the strength & thermal insulation for cement concrete works.
9. In this project we used the crushed pebbles as a sand. Which is produced by crushing the pebbles is one of the alternative material. In that the crushed pebble stone used as a fine aggregate partial replacement at the same percentage of 10%, 20% &30% respectively.

MIXING PROCEDURE

1. Mix the concrete by hand or preferably in laboratory batch mixer avoiding loss of any material or water.
2. The period of mixing should not be less than two minutes after adding all materials in drum, in case machine mixing. In the case of hand mixing first mix cement and fine aggregate until a uniformly add coarse aggregate to the earlier mix and mix all materials are uniformly spread throughout the batch.
3. Add water and mix the entire batch until the all materials are uniformly concrete appears to be homogenous and attain the required consistency.
4. Apply a thin coat of oil to the base plate and interior faces of the moulds, prevent adhesion of concrete.
5. Fill the mould with fresh concrete in layer approximately 5cm deep, the concrete with travel, moving it around top edge of mould allowing the concrete to slide in a symmetrical manner without any segregation.
6. In case of compaction by vibration place the mould on vibration table & vibrate each layer until the specified condition reached.
7. In case of hand compaction each layer should be well tamped by using standard tamping rod, disturb utiling the over entire surface. The number if blows required for each layer to obtain specific condition are.
8. 15cm cubical mould—not less than 35 blows.
9. Cylindrical specimen – not less than 30 blows.
10. The strokes must penetrate in to the underlying layer & it should be rodded throughout its depth tap the sides of mould to close the void left by tamping.
11. After filling the mould & compaction remove the excess material using trowel.

9 TESTING & RESULTS

Compression test results:-

0 % Replacement of PJA & PSP compressive strength values for 7days, 14 days 28 days.

Test 3 cubes for each 7days, 14days & 28days

Table: 1: 0 % Replacement of PJA & PSP for 7days, 14 days 28 days.

S.no	Compressive load [KN]	Compressive strength [N/mm²]	days
1	360	16	7 days
	385	17.11	
	410	18.22	
2	520	23.11	14 days
	490	21.77	
	514	22.84	
3	600	26.66	28 days
	580	25.77	
	520	23.11	

10 % Replacement of PJA & PSP compressive strength values for 7days, 14 days 28 days.

Test 3 cubes for each 7days, 14days & 28days

Table: 2: 10 % Replacement of PJA & PSP for 7days, 14 days 28 days

S.no	Compressive load [KN]	Compressive strength [N/mm²]	days
1	420	18.6	7 days
	400	17.7	
	480	21.38	
2	525	23.33	14 days
	540	24.00	
	510	22.67	
3	624	27.73	28 days
	664	29.51	
	610	27.11	

20 % Replacement of PJA & PSP compressive strength values for 7days, 14 days 28 days.

Test 3 cubes for each 7days, 14days & 28days

Table: 3: 20 % Replacement of PJA & PSP for 7days, 14 days 28 days

S.no	Compressive load [KN]	Compressive strength [N/mm²]	days
1	420	18.6	7 days
	460	20.44	
	440	19.50	
2	590	26.22	14 days
	550	24.44	
	490	21.77	
3	618	27.46	28 days
	680	30.22	
	654	29.06	

30 % Replacement of PJA & PSP compressive strength values for 7days, 14 days 28 days.

Test 3 cubes for each 7days, 14days & 28days

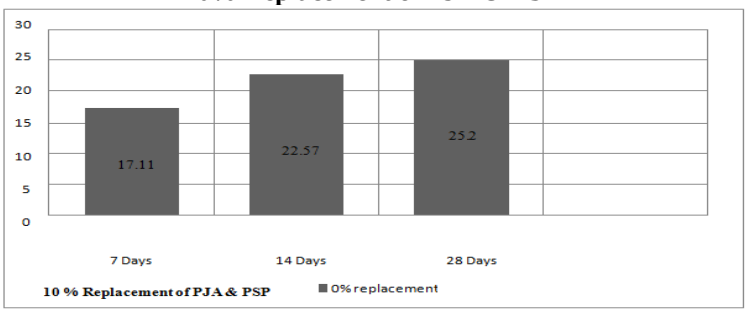
Table: 4: 30 % Replacement of PJA & PSP for 7days, 14 days 28 days

S.no	Compressive load [KN]	Compressive strength [N/mm²]	days
1	345	15.3	7 days
	320	14.22	
	330	14.86	
2	450	20.0	14 days
	440	19.6	
	480	21.3	
3	528	23.78	28 days
	552	24.53	
	518	23.02	

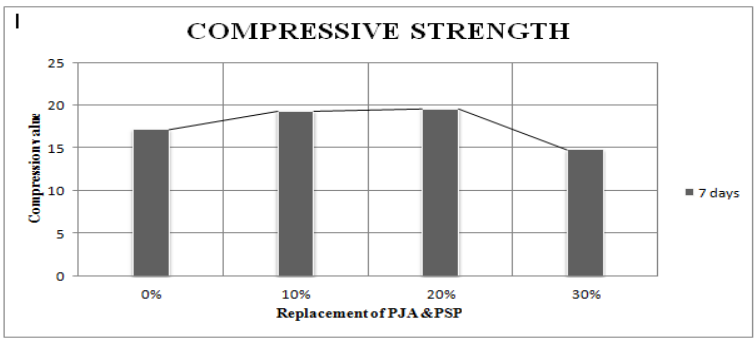
GRAPHS :

Graphs of 7 days 14 days & 28 days :

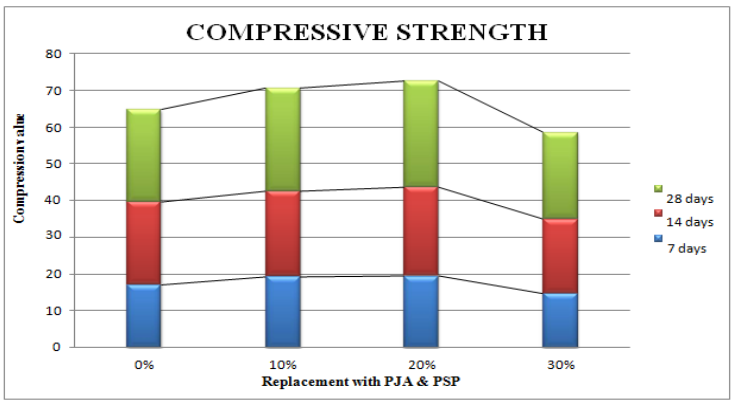
0% Replacement of PJA & PSP



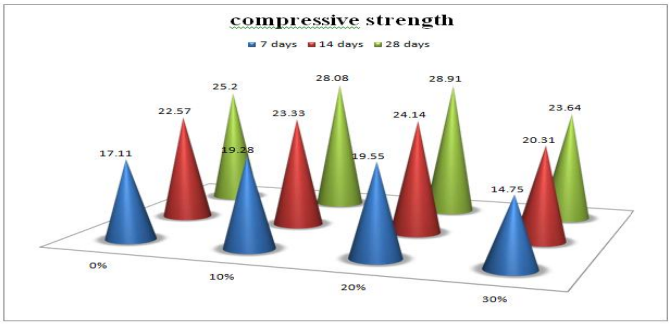
Compression of strength varies in 7 days, 14 days, 28 days



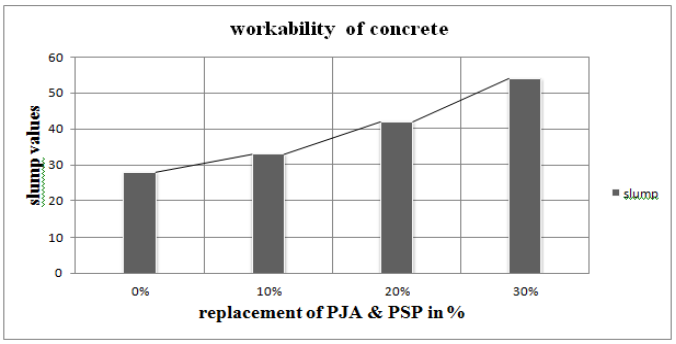
TOTAL COMPRESSIVE STRENGTH



COMPRESSIVE STRENGTH WITH DIFFERENT PERCENTAGES



WORKABILITY



10 CONCLUSION

The above study two cases:

1. Cement partial replaced with juliflora ash
2. Fine aggregate partial replaced with pebble stone powder.

The cement can be partial replaced with Prosopis juliflora ash by different percentage Prosopis juliflora ash mixed in concrete mix. Ultimately 20% Prosopis juliflora ash is partial replaced in cement was given good results as compared to conventional concrete and other percentages Prosopis juliflora ash mixed in concrete. As compared to conventional concrete the strength has been increased by adding 20% of Prosopis juliflora ash in cement.The Cement and fine aggregate both are partial replaced with Prosopis juliflora ash & pebble stone powder by different percentage proportion mixed in concrete. The finally in both fine aggregate and cement can be 20% partially replaced concrete satisfy the conventional concrete as compared to other percentages Prosopis juliflora ash & pebble stone powder. Fine aggregate and cement replaced with Prosopis juliflora ash & pebble stone powder with 20%, increases of strength as compared to the conventional concrete strength.
After that strength gradually slips while increasing the percentage of prosopis juliflora. The replacement of cement with prosopis juliflora up to 20% is desirable, as it is cost effective. As a result of these, this research work concludes that more than 20% of prosopis juliflora is not a suitable material for cement replacement in concrete. The colors of sand and crushed pebbles are relatively same appearance. The compressive strength, Flexural Strength, Tensile Strength of concrete for grade of M20 with crushed pebbles as fine aggregate were found to be comparable with the concrete made with river bed sand. Crushed pebbles cannot effectively be used in plain concrete in place of fine aggregate. We can use crushed pebbles partially for the replacement of sand in concrete.

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