ASTONJADRO: Jurnal Rekayasa Sipil

pISSN 2302-4240
eISSN 2655-2086

Volume 10, No. 1, Juni 2021, Halaman 81-85
DOI: http://dx.doi.org/10.32832/astonjadro.v10i1

PRESS STRONG CONCRETE ADDED SHELL OF *KEONG SAWAH*

Pandu Dimas Gumilang[1], Hendramawat Aski Safarisky[1], Marwahyudi Marwahyudi[2]
[1]Civil Engineering Departement Universitas Veteran Bangun Nusantara, Sukoharjo, INDONESIA
[2]Researcher Gfy Research Group, Usahid Surakarta, INDONESIA
E-mail: yudhie_dsg@yahoo.co.id

ABSTRACT

Concrete is a building structure whose development is relatively fast because it is an important part of development. Shells of *keong sawah*, which are pests for rice plants, can also be used as an added material in making concrete because they contain a large amount of calcium carbonate. This study aims to determine the effect of adding shells of *keong sawah* on the compressive strength of concrete with a variation of 0% and 15% on the weight of cement. This research was conducted using a cylindrical concrete specimen with a diameter of 15 cm and a height of 30 cm. The results showed that the addition of 15% powder shells of *keong sawah* had an increase in compressive strength, namely 31.1 MPa when compared to the 0% variation with a compressive strength value of 25.6 MPa. It can be concluded that in this study the addition shells of *keong sawah* 15% by weight of cement can increase the compressive strength of the concrete.

Keywords: shells of *keong sawah;* influence; compressive strength of concrete; added materials.

Received:	Revised:	Accepted:	Available online:
2020-12-30	2021-02-05	2021-03-09	2021-04-09

INTRODUCTION

Concrete is one of the fastest growing building structures because it has several advantages and is used as an innovation project to create concrete that is more effective, efficient and economical in its use. Increasing the compressive strength of concrete is one of the innovations that is often carried out, by utilizing chemicals or using materials around us that contain natural minerals that can interact with the building blocks of concrete.

Shell of *keong sawah* is a type of freshwater snail that is often found in rice fields and is a pest of rice plants. Rice snails have dark shells and contain several natural minerals such as calcium carbonate (CaCO3), iron, magnesium, potassium and phosphorus. The calcium carbonate content contained in these shells can be used as an additive in making concrete.

Similar studies have been conducted by predecessors with the most effective addition variation in each study is 5% (Hartantyo & Susianto, Muhammad Hakim, 2019) and 10% (Putra et al., 2019).

This study aims to determine the maximum effectiveness level of using snail shells as an added material in making concrete with a variation of 0% and 15%.

The compressive strength of concrete is influenced by many factors. The factor with the greatest influence is the addition of additives. Substances or concrete additives have a very significant effect if the cement water factor is also considered for the addition of its composition (M.Marwahyudi, 2020); (M.Marwahyudi, 2019); (M.Mubarak, et.al, 2020). Further research is needed to examine the strength of concrete, both for housing/lightweight concrete and for structural concrete, especially for structural components of buildings (M.Lutfi, E.Rusandi, 2019); (M.Lutfi, subtoni, 2017). No less important is the reinforcement of the concrete used for roads such as rigid pavement, this reinforcement is of high quality concrete quality. So that the resulting concrete with a very long design life so that it can reach its maximum life. It should also be noted that concrete with road construction needs to be taken care of so that it can last a long time (S.Syaiful, L. Lasmana, 2020); S.Syaiful, 2020).

RESEARCH METHOD

The research was conducted at the Civil Engineering Laboratory, Faculty of Engineering, Universitas Veteran Bangun Nusantara Sukoharjo. The research begins with testing the materials that will be used in making concrete with the test results as shown in Table 1 and Table 2.

Table 1. Fine Aggregate Data

Information	Standard	Result Examination
Value SSD	> ½ cone height	15 cm
Specific gravity	2,50 – 2,90	2,66
Absorbtion	< 3%	2,88
Mud content	< 5%	0,5 %
Fine grain modulus	1,5 – 3,8	2,88, 2,95, 2,58

Tabel 2. Coarse Aggregate Of Data

Information	Standard	Result Examination
Specific gravity	2,50 – 2,70	2,7
Absorption	< 3%	0,75%
Maximum grain	20 mm	20 mm

This research uses powder shell of *keong sawah* which has gone through several stages such as washing, drying, refining and filtering which will then be used as an additive in making concrete. The addition of powdered shell of *keong sawah* used a variation of 0% and 15% by weight of cement. Each variation uses 5 samples of test objects and will be tested using a compression testing machine at the age of 28 days with the formula:

$$Fc' = \frac{P}{A} \quad (1)$$

(SNI1974-2011, 2011), and also treated specimens for 14 days during the drying process. The results obtained will then be analyzed and conclusions drawn regarding the scope of discussion in the research conducted.

RESULTS AND DISCUSSION

The results of the normal concrete (NC) compressive strength test are equal to 23,5 MPa, 26,3 MPa, 26,9 MPa, 25,7 MPa, 26,2 MPa with average values 25,6 MPa, on the variation of addition powder shell *of keong sawah* (SKS) 15% get results 30,4 MPa, 31,6 MPa, 33,6 MPa, 29,1 MPa, 30,7 MPa with average values 31,1 MPa.

ASTONJADRO: Jurnal Rekayasa Sipil
pISSN 2302-4240
eISSN 2655-2086
Volume 10, No. 1, Juni 2021, Halaman 81-85
DOI: http://dx.doi.org/10.32832/astonjadro.v10i1

Table 3. The results of the 28-day-old concrete compressive strength test.

No	Added level Powder Shell of *Keong Sawah*	Concrete weight Cylinder (kg)	Code Object test	Age of concrete (day)	Strong Press (MPa)	Compressive strength Average (MPa)
		12,40	NC.0%	28	23,5	
		12,89	NC.0%	28	26,3	
1	0%	12,52	NC.0%	28	26,9	25,6
		12,50	NC.0%	28	25,7	
		12,74	NC.0%	28	26,2	
		12,47	SKS.15%	28	30,4	
		12,59	SKS.15%	28	31,6	
2	15%	12,46	SKS.15%	28	33,6	31,1
		12,29	SKS.15%	28	29,1	
		12,31	SKS.15%	28	30,7	

The results of the compressive strength test obtained the compressive strength of the test object with added material powder shell *of keong sawah* 0% amounting to 25,6 MPa, and 15% increase in compressive strength to 31.1 MPa in powder shell of *keong sawah*.

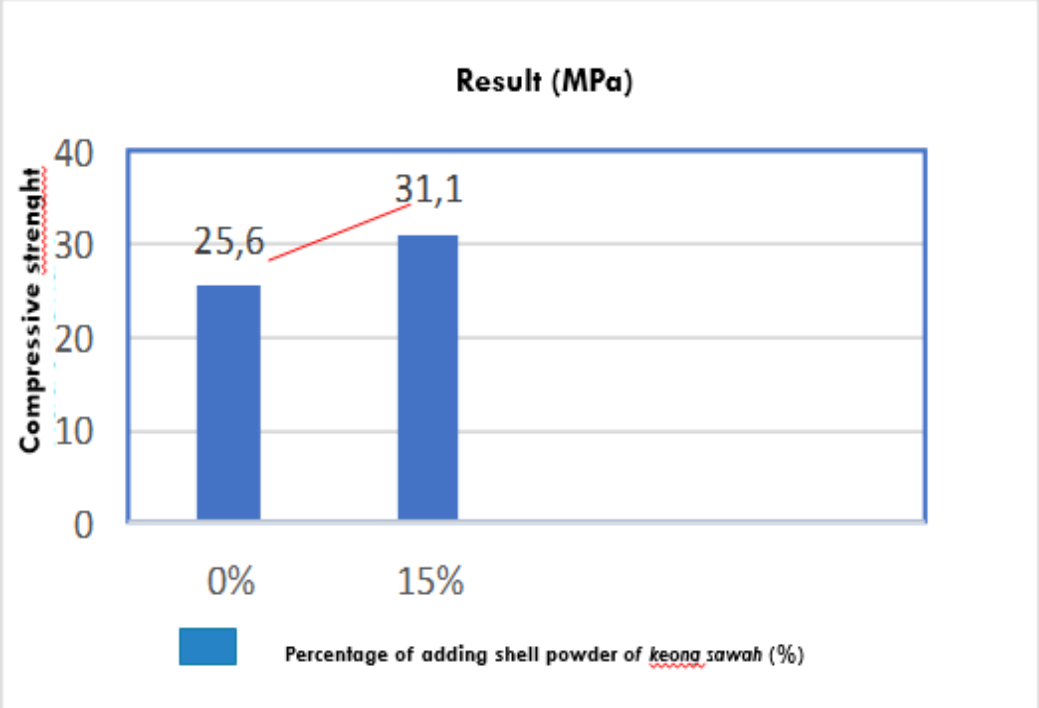

Figure 1. Graph of concrete compressive strength test results

Judging from the damage to the test object, only fine cracks and coarse cracks did not collapse, it can be seen in the figure 2, figure 3, figure 4 and figure 5 below.

Figure 2. Normal concrete yield 1

Figure 3. Normal concrete yield 2

Figure 4. Concrete yield SKS 15% 1

Figure 5. Concrete yield SKS 15% 2

Damage to normal concrete occurs on average coarse cracks and there are some loose parts, while in SKS concrete, on average, there are only fine cracks and a few have rough cracks.

CONCLUSION

After physical analysis of the test object and the resulting compressive strength results, it can be concluded that the addition of SKS 15% of the cement weight can increase the compressive strength to 31.1 MPa, and the compressive strength of concrete without SKS only gets a compressive strength of 25.6 MPa. Judging from the damage that occurred, concrete with SKS suffered less damage than concrete without SKS. The use of water used in the curing process also affects the color of the test object as in Figure 2 and Figure 4 where Figure 2 has a dark color.

REFERENCE

Hartantyo, Sugeng Dwi, and Kardiyono Susianto, Muhammad Hakim. 2019. “PENGARUH PENAMBAHAN TUMBUKAN CANGKANG KEONG MAS TERHADAP KUAT TEKAN BETON NON STRUKTUAL K-175” 3 (2): 94–102. (Indonesian)

pISSN 2302-4240
eISSN 2655-2086

Volume 10, No. 1, Juni 2021, Halaman 81-85
DOI: http://dx.doi.org/10.32832/astonjadro.v10i1

Marwahyudi Marwahyudi, 2020. STIFFNESS DINDING BATU BATA MENINGKATKAN KEKUATAN STRUKTUR, ASTONJADRO: JURNAL REKAYASA SIPIL 9 (1),pp.30-37. (Indonesian). http://ejournal.uika-bogor.ac.id/index.php/ASTONJADRO/article/view/2840

Marwahyudi Marwahyudi, 2019. TEGANGAN GESER BATU BATA BERKONSTRUKSI PADA DINDING RUMAH RAWAN GEMPA, ASTONJADRO: JURNAL REKAYASA SIPIL 8 (2),pp.80-86. (Indonesian). http://ejournal.uika-bogor.ac.id/index.php/ASTONJADRO/article/view/2725

M Mubarak, R Rulhendri, S Syaiful, 2020. Perencanaan Peningkatan Perkerasan Jalan Beton Pada Ruas Jalan Babakan Tengah Kabupaten Bogor, ASTONJADRO: JURNAL REKAYASA SIPIL 9 (1), 1-13. (Indonesian). http://ejournal.uika-bogor.ac.id/index.php/ASTONJADRO/article/view/2694

Muhamad Lutfi, Erwin Rusandi, 2019. Evaluasi Struktur Bangunan Ruko Akibat Penambahan Beban Atap Berupa Mini Tower. Jurnal Rekayasa Sipil ASTONJADRO, 8 (2), pp. 87-96. (Indonesian).

Muhamad Lutfi, Subtoni, 2017. Kajian Struktur Bangunan Akibat Penurunan Mutu Beton pada Kolom Terpasang (Studi Kasus SDN 01 Cikaret Kabupaten Bogor). Jurnal Rekayasa Sipil ASTONJADRO, 6 (2), pp.115-129. (Indonesian).

Putra, Riski Yendrawan, Steenie E Wallah, Ronny Pandaleke, Fakultas Teknik, Jurusan Teknik Sipil, and Universitas Sam Ratulangi. 2019. “PENGARUH PEMANFAATAN CANGKANG KEONG SAWAH SEBAGAI SUBSTITUSI AGREGAT HALUS (PASIR) DITINJAU” 7 (11): 1477–84. (Indonesian)

Putry, Rara Andrea, Anissa Diyah Lestari, and Pradam Gussehta Erwialdo. 2019. “BETON MUTU TINGGI DENGAN CAMPURAN SERBUK KEONG SAWAH SEBAGAI BAHAN ALTERNATIF RAMAH LINGKUNGAN,” no. 1850100094. (Indonesian)

SNI – 7656 – 2012. 2012. TATA CARA PEMILIHAN CAMPURAN UNTUK BETON NORMAL , BETON BERAT DAN BETON MASSA. (Indonesian)

SNI, 0. 1.-1. (1990). TENTANG METODE PENGUJIAN KUAT TEKAN BETON. Jakarta: Departemen Pekerjaan Umum. (Indonesian)

SNI 03 2847. 2002. “TATA CARA PERHITUNGAN STRUKTUR BETON UNTUK BANGUNAN GEDUNG.” BANDUNG: BADAN STANDARDISASI NASIONAL, 251. (Indonesian)

S Syaiful, L Lasmana, 2020. A STUDY ON LEVEL OF RAILWAY ROAD DAMAGE WITH SUSTAINABLE PCI METHOD, ARPN Journal of Engineering and Applied Sciences 15 (8), 962-968. http://www.arpnjournals.org/jeas/research_papers/rp_2020/jeas_0420_8184.pdf

S Syaiful, 2020. ANALYSIS ON THE ADDITION OF FIBER THE STRONG BENDING MIXED CONCRETE, ARPN Journal of Engineering and Applied Sciences 15 (6), 724-729. http://www.arpnjournals.org/jeas/research_papers/rp_2020/jeas_0320_8152.pdf

Tjokrodimulyo. 2007. “TEKNOLOGI BETON”. Yogyakarta: Biro Penerbit Jurusan Teknik Sipil UGM.

Wijaya. 2013. “KAJIAN KUAT TEKAN BETON DENGAN KALSIUM KARBONAT SEBAGAI SUBSTITUSI SEBAGIAN PORTLAND CEMENT,” 1–4. (Indonesian)

Windaka, Buyung Wendi. 2012. “A STUDY OF COMPRESSIVE STRENGTH OF CONCRETE WITH ARTIFICIAL CALCIUM CARBONATE AS REPLACEMENT PART OF PORTLAND CEMENT.”