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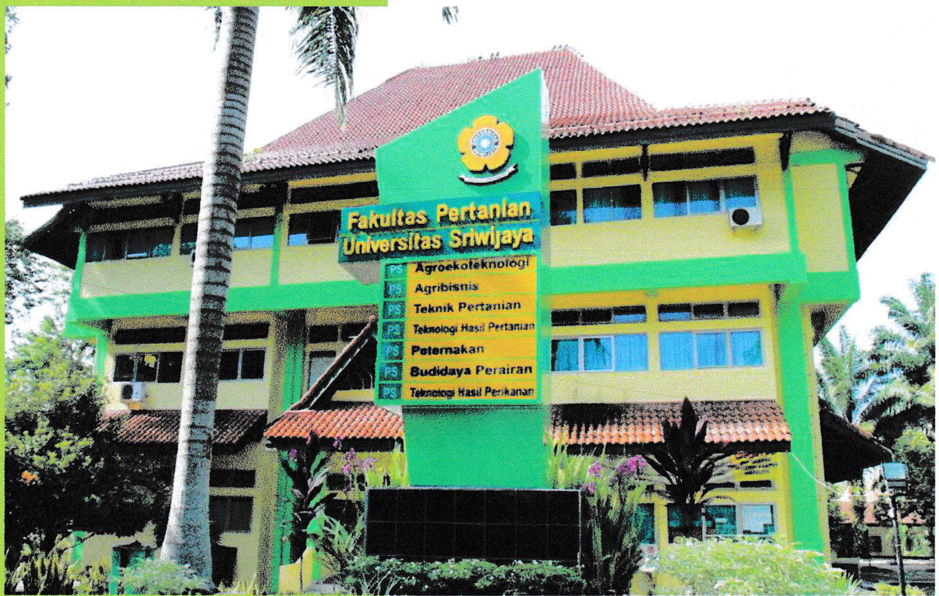
Prosiding

SEMINAR NASIONAL

DALAM RANGKA DIES NATALIS KE-52
FAKULTAS PERTANIAN UNIVERSITAS SRIWIJAYA

TEMA :

Pengembangan Iptek, Sumberdaya Manusia Dan Kelembagaan Dalam Pengembangan Pertanian Yang Berkelanjutan Dan Berdaya Saing



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Palembang, 5 November 2015

Fakultas Pertanian Universitas Sriwijaya
Bekerjasama dengan
PERHEPI

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KATA PENGANTAR
DEKAN FAKULTAS PERTANIAN

RPJMN tahap ke-3 (2015-2019) difokuskan untuk memantapkan pembangunan secara menyeluruh dengan menekankan pembangunan kompetitif perekonomian yang berbasis sumber daya alam yang tersedia, sumber daya manusia yang berkualitas dan kemampuan penguasaan ilmu pengetahuan dan teknologi (IPTEK). Dengan demikian, ke depan sektor pertanian masih menjadi sektor penting dalam pembangunan ekonomi nasional. Peran strategis sektor pertanian tersebut digambarkan dalam kontribusi sektor pertanian dalam penyedia bahan pangan dan bahan baku industri, penyumbang PDB, penghasil devisa negara, penyerap tenaga kerja, sumber utama pendapatan rumah tangga perdesaan, penyedia bahan pakan dan bioenergi, serta berperan dalam upaya penurunan emisi gas rumah kaca (GRK).

Perguruan tinggi, khususnya yang berhubungan dengan pertanian secara umum, kehutanan, perkebunan, peternakan, dan perikanan mempunyai peranan yang sangat penting untuk menghasilkan produk pertanian, peternakan dan perikanan yang berkualitas serta untuk meningkatkan nilai tambah produk pertanian sehingga kualitas dan harganya dapat bersaing di tingkat lokal, regional ASEAN, dan internasional. Pemerintah, Fakultas Pertanian Universitas Sriwijaya, dan PERHEPI dalam kaitan ini sebagai para pihak yang turut bertanggung jawab dalam menyukseskan pembangunan pertanian di Indonesia berkewajiban untuk mengkaji, menganalisis dan menyumbangkan "gagasan" dan "buah pikir" dari perspektif tinjauan konseptual, teoritis dan empiris untuk mencapai Pengembangan Pertanian yang Berkelanjutan dan Berdaya saing.

Seminar merupakan salah satu wahana untuk mengekspos dan mengevaluasi hasil penelitian atau hasil kajian pemikiran sehingga dapat diketahui dan dimanfaatkan oleh masyarakat. Oleh karena itu seminar senantiasa menjadi acara rutin dalam rangka Dies Fakultas Pertanian. Tahun ini, Fakultas Pertanian kembali melaksanakan kegiatan Seminar Nasional dalam Rangka Dies Natalis Ke-52 dengan Tema Umum "Pengembangan Iptek, Sumberdaya Manusia Dan Kelembagaan Dalam Pengembangan Pertanian Yang Berkelanjutan Dan Berdaya Saing'.

Pada kesempatan ini, saya mengucapkan terima kasih atas partisipasi semua peserta yang datanga dari luar daerah yaitu Bogor, Jambi, Bengkulu, Bangka, Baturaja, Medan, Makasar, dan bahhan Papua. Dengan partisipasi Bapak/Ibu semua maka kegiatan ini dapat dilaksanakan. Juga saya ucapkan terima kasih dan penghargaraan yang tinggi atas kerja keras panitia, yang bekerja dalam waktu yang singkat tetapi hasilnya sangat memuaskan.

Palembang, 20 Januari 2016
Dekan,

Dr. Ir. Erizal Sodikin

Prosiding Seminar Nasional Dies Natalis ke-52 Fakultas Pertanian Universitas Sriwijaya,
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KATA PENGANTAR
KETUA PANITIA

Penerbitan Prosiding Seminar Nasional dalam Rangka Dies Natalis Ke-52 Fakultas Pertanian Universitas Sriwijaya dengan Tema Umum "Pengembangan Iptek, Sumberdaya Manusia Dan Kelembagaan Dalam Pengembangan Pertanian Yang Berkelanjutan Dan Berdaya Saing'

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Palembang, 20 Januari 2016

Ketua Panitia,

Dr. Ir. M. Yamin, M.P.

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INFORMASI UMUM

TEMA
PENGEMBANGAN IPTEK, SUMBERDAYA MANUSIA, DAN KELEMBAGAAN DALAM PENGEMBANGAN PERTANIAN YANG BERKELANJUTAN DAN BERDAYA SAING.

SUBTEMA
1. Budidaya Pertanian yang Berkelanjutan dan Berdaya Saing
2. Proteksi Tanaman dan Gulma yang Berkelanjutan dan Berdaya Saing
3. IPTEK Pengolahan Hasil Pertanian
4. Kelembagaan dan Permodalan untuk mendukung Pengembangan Pertanian
5. Nilai Tambah, Daya Saing dan Pemasaran Produk Pertanian
6. Pengelolaan Limbah Pertanian
7. Pertanian, Emisi Gas Rumah Kaca dan Perubahan Iklim
8. Kebijakan Nasional dan daerah dalam Pengembangan Pertanian Berkelanjutan dan Berdaya Saing
9. Kearifan Lokal Pengelolaan Pengembangan Pertanian Berkelanjutan dan Berdaya Saing
10. Kesiapan Sumber Daya Manusia dalam mendukung Pengembangan Pertanian Berkelanjutan dan Berdaya Saing

BIDANG YANG DIDISKUSIKAN
1. *Bidang Agroekoteknologi (termasuk didalamnya Budidaya Pertanian, Ilmu Tanah, Hama dan Penyakit Tanaman),*
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4. *Peternakan dalam arti luas*
5. *Agribisnis (Agribisnis dan Penyuluhan Pertanian)*

TUJUAN
Melaksanakan Seminar Nasional dalam rangka menyumbangkan "gagasan" dan "buah pikir " secara Konseptual, Teoritis dan Empiris untuk PENGEMBANGAN IPTEK, SUMBERDAYA MANUSIA, DAN KELEMBAGAAN DALAM PENGEMBANGAN PERTANIAN YANG BERKELANJUTAN DAN BERDAYA SAING

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POSTER

EKSPLORASI PENGARUH BAHAN INDUK TANAH TERHADAP PENDAPATAN PETANI KELAPA SAWIT

Exploring Influences of Soil Parent Materials on Oil Palm Farmer's Income

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ABSTRACT

The research objectives aimed to determine the difference between properties of two soil types and to investigate the influences of soil parent materials on oil palm farmer's income. The soil profiles of Granite soils (located in Tebolang Estate, Malacca) and Basalt soils (from Jabor Valley Estate, Pahang, Malaysia) were intensively described and composite soil samples were taken after completing soil profile descriptions and analyzed in the laboratory. The mineral weathering of Granite and Basalt is divided into three categories, i.e. very slow weathered mineral (quartz and muscovite), slowly weathered mineral (K- feldspar, Na and Ca-feldspar and biotite), and easily weathered mineral (hornblende, augit, olivine, dolomite, calcite and gypsum). Losing mineral during weathering process from Granite to clay is determined by containing mineral in rocks. Minerals (CaO, Na_2O, K_2O, MgO and SiO_2) loosed 100 %, 95.0 %, 83.5 %, 74.7 % and 52.5 % respectively, but Fe_2O_3 is disappeared only 14.4 %. Soil properties characters of Granite soil is more acid, has very low to low chemical soil fertility and is dominated by sand fraction. Basalt soil is acid, has low to moderate chemical soil fertility and is dominated by clay fraction. Granite and Basalt soils are able to produce FFB (Fresh Fruit Bunches of Oil Palm) 15-18 ton/ha in a year and 20-25 ton/ha in a year respectively. The production difference of both soils is around 5.0-6.0 ton/ha in a year. The farmer's Income for Granite and Basalt soils were Rp 19.10-25.40 Mills/ha and Rp 29.60-40.10 Mills/ha in a year respectively.

Keywords: *Influences, Soil Parent Materials, Oil Palm, Farmer's Income.*

ABSTRAK

Tujuan penelitian ini adalah menentukan perbedaan sifat dua jenis tanah dan untuk menyelidiki pengaruh bahan induk tanah terhadap pendapatan petani sawit. Profil tanah Granit (terletak di Tebolang Estate, Malaka, Malaysia) dan tanah Basalt (dari Jabor Valley Estate, Pahang) didiskripsikan secara intensif dijelaskan. Sampel tanah komposit diambil setelah melakukan deskripsi profil tanah dan dianalisis di laboratorium. Pelapukan mineral Granit dan Basalt dibagi menjadi tiga kategori, yaitu mineral sangat lambat lapuk (kuarsa dan muskovit), mineral lambat lapuk (K feldspar, Na dan Ca-feldspar dan biotit), dan mineral mudah lapuk (hornblende, augit, olivin, dolomit, kalsit dan gipsum). Kehilangan mineral selama proses pelapukan dari Granit ke tanah liat ditentukan oleh mineral dalam batuan. Mineral (CaO, Na_2O, K_2O, MgO dan SiO_2) dilepaskan masing-masing 100%, 95,0%, 83,5%, 74,7% dan 52,5%, namun Fe_2O_3 terlapuk hanya 14,4%. Sifat tanah Granit lebih masam, memiliki kesuburan kimia tanah sangat rendah sampai rendah dan didominasi oleh fraksi pasir. Tanah Basalt bersifat masam, memiliki kesuburan kimia tanah rendah sampai sedang dan didominasi oleh fraksi liat. Tanah Granit dan Basalt mampu menghasilkan TBS (Tandan Buah Segar) masing-masing 15-18 ton/ha per tahun dan 20-25 ton/ha per tahun. Perbedaan

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produksi kedua tanah sekitar 5,0-6,0 ton/ha per tahun. Pendapatan petani untuk tanah Granit dan Basalt adalah masing-masing Rp 19,10-25,40 Juta/ha dan Rp 29,60-40,10 Juta/ha per tahun.

Kata kunci: Pengaruh, Bahan Induk Tanah, Kelapa Sawit, Pendapatan Petani

INTRODUCTION

One obvious performance of igneous rock landscape in West Malaysia is the extensive and intensive oil palm plantation activities followed by a different FFB (Fresh Fruit Bunches of Oil Palm) production (Adzemi, 1999, Armanto *et al.,* 2008). Based on the geological map of Malaysia, it can be seen that the soil variability largely derived from different parent materials. These conditions make it possible to compare the soil productivity based on different soil parent material (Armanto, 1992). By lithology, the soil parent material may be acid (Granite) or basis (Basalt).

After intensive weathering process, the difference between the soils derived from Granite and Basalt becomes difficult to be morphologically recognized in the field because soil formation is generally very dominantly influenced by drainage conditions, degree and levels of physical, chemicals and biological rock weathering (Armanto, 2014, 2013, Imanudin *et al.,* 2012). The objectives of this research are to determine the difference between properties of two soil types (Granite and Basalt soils), and to investigate the influences of soil parent materials on oil palm farmer's income. It is expected that the results of this research can provide basic information on potential reserves of nutrients to improve soil productivity for oil palm and farmer's income.

MATERIALS AND METHODS

The research sites are based on the different soil parent materials (Granite and Basalt rocks) by using geology maps with 1:100,000 scale. The soils derived from Granite are called the Granite soils and from Basalt are named Basalt soils. Granite soils located in Tebolang Estate, Tebong, Malacca, Malaysia and Basalt soils from Jabor Valley Estate, Pahang were intensively described (Soil Survey Staff, 2014). Composite soil samples were taken after completing soil profile descriptions and then analyzed in the laboratory. Soil color was determined using Munsell Soil Color Chart. Bulk density, weathering indices and chemical analysis (organic carbon, pH, total nitrogen, CEC and exchangeable cations) were determined according to Sparks (1996). Particle-size analysis was performed using hydrometer method. FFB of oil palm was determined by field square method of 25 m x 25 m size and combined with the questionnaire results and interview to the farmers. The FFB prices was determined by FELDA Malaysia.

RESULTS AND DISCUSSION

Descriptions of Soil Morphology

Horizons: A pedogenetically characteristic horizon is given for Granite soils by the Bt-horizon (clay migration). Clayey C-horizons are characterized by clay contents (> 57 %), but the more intensively percolated clay has no organic C throughout profiles. There are systematical changes of horizons in all profiles. The horizons are dominated by combinations of Ap-B_{1t}-B_{21t}-B_{22t} horizons. The Basalt horizons are characterized by five classes (Ap, AB, B_{21ox}, B_{22ox} and B_{23ox} combinations), however both soils the "C"-horizons are weathered. The clay migration is not pronounced

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(thus B horizon is not indexed by a t). Generally, both soils are well drained and ground water tables are located at depth of > 150 cm and become poorly drained with decreasing depths. Most horizons are highly oxidized as shown by thick of ox layers, which predominate from 19-150 cm.

Soil Color: The colors of the Granite soils have Hues of 10YR with Munsell values of 5 and chromas from 2-3. Subsoils are characterized by Hues of 10YR, Munsell values of 5-6 and chromas of 6-8. Typical red colors of Oxisols (Hue < 5YR) have not been recorded in the soils. The surface Basalt Soils mainly have Hue codes of 7.5 YR at soil matrices with Munsell values of 4 and chromas from 2 to 4, only. Subsoils have similar hues (7.5 YR), but Munsell values are generally 4 and chromas are 4. Thus, topsoils are discriminated from subsoil material by Munsell chromas of 4

Bulk Density: The Granite soils show significant compaction or show a decrease one with the depth. The highest bulk density takes places at the depth of > 70 cm. The bulk density of the Basalt soils is relatively stable from topsoil to subsoils (0.93 g/cm^3). The compaction effect did not happen in the profile. The main field and laboratory data from selected profiles of both soils are summarized in Table 1.

Texture: The Granite soils consist of 2-4 % silt and 35-50 % clay. A systematic change of soil texture transverses the depths: soils are loamy in the topsoils and become towards clayey on lowest horizon. The soils have the highest sand fractions in surface soils (66 %) and reach the lowest values at depths of 70-150 cm. In these layers, clay concretions are found at maximum concentrations. Based on differences of clay content in A- to B-horizons, clay migration of granite soils is very high (around 40 %). Texture class of the basalt soils is classified as clay. The profile does not show clay migration from A to B-horizons. The differences in clay content between A and B-horizons are less than 20 %.

Table 1. Soil variability as affected by its parent materials */

Soil characters	Granite soils		Basalt soils	
	5-18 cm	18-40 cm	10-19 cm	19-56 cm
Bulk density (kg/dm^3)	nm	1.31	nm	0.93
pH (H_2O)	4.8 (va)	4.8 (va)	4.4 (va)	4.6 (va)
C-organic (%)	0.99 (h3)	0.56 (h2)	2.11 (h3)	2.15 (h3)
N-total (%)	0.09 (l)	0.06 (vl)	0.18 (m)	0.10 (l)
C/N	10.4 (high)	8.9 (vh)	11.8 (h)	11.4 (h)
CEC (cmol(+)/kg soil)	3.87 (vl)	3.45 (vl)	12.52 (l)	8.19 (l)
Ca (cmol(+)/kg soil)	0.09 (vl)	0.09 (vl)	0.04 (vl)	0.06 (vl)
Mg (cmol(+)/kg soil)	0.05 (vl)	0.02 (vl)	0.05 (l)	0.02 (l)
K (cmol(+)/kg soil)	0.06 (l)	0.03 (vl)	0.01 (l)	0.06 (vl)
Base saturation (%)	6.0	4.9	1.76	1.96
MR (0 bar, %)[1/]	nm	46.6	nm	59.3
MR (0.1 bar, %)	nm	30.5	nm	44.3
MR (0.33 bar, %)	nm	23.5	nm	39.3
MR (15 bar, %)	nm	17.2	nm	26.8
AW (mm/1.5 m) [2/]	--	199.5	--	265.2
Soil texture class	Sandy clay loam	Sandy clay	Clay	Clay
Coarse sand (%)	44.6	46.5	2.6	1.9
Fine sand (%)	16.8	9.6	5.8	9.6
Silk (%)	4.2	3.3	28.1	32.9
Clay (%)	34.4	40.6	63.5	55.6
Silt/clay ratio	0.12	0.08	0.44	0.59

Explanation: [1/] MR: Moisture retention, [2/] AW: Available water (mm/1.5 m soil depth), nm: Not measured, na: Not available, va: very acid, h3: Humus, h2: Weakly humus: vh: very high, h: high, m: middle, l: low, vl: very low

Description: */ Assessment is based on the general nature of soils.

Source : Laboratory Analysis Results (2014) and Adzemi (1999).

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Weathering Indices: In general, fine-sized minerals are more sensitive to chemical destruction than the large size of mineral (rough minerals) because the surface area of the small particle-particle is wider, so it gives the chances of a larger chemical destruction. For example quartz sand size is highly resistant to chemical destruction, if the clay size quartz, the size of clay is very sensitive to weathering. In the Granite soils, sand by achieving percentage of 58 % is the most dominant soil characteristics compared with the Basalt soils. In both soils, coarse sand and fine sand ratios may play an important role for present indices of parent material homogeneity. It seems that both soil profiles are developed from homogenous parent materials. The profile shows a relatively homogeneous content in all horizons. The indices of homogeneity (the fine to coarse sand ratios throughout the profile) may show the unique numbers that the soils were formed from the same parent material (Granite and Basalt). The ratio of silt to clay gives indices to weathering and soil development (Lamp *et al.*, 1995). This is based on the fact that the more weathered the soils are, the lower the silt contents. If the silt clay ratio is less than 0.15, the soils are classified as highly weathered. The Granite soils show 0.04-0.12 that means the Granite soils belong to highly weathered soils. However, the Basalt soils give the figure of above 0.15 (0.37-0.59), the soils are (relatively) young. The Basalt soils are classified as young weathered soils, except the topsoils.

Descriptions of Chemical Soil Properties

Soil Reaction: Both soils showed that pH values are very low and their ranges are also very low (4.4-4.8). Only slight changes of pH values are observable throughout the profiles. Small increases are given from upper to lower horizons, except for the Ap (recycled bases). The soil reaction is almost homogeneous for all horizons (4.4-4.6). The highest pH values are found at found at depths of more than 56 cm (pH value of 4.7). Not significantly different pH values because of clay found in these soils is dominated by caolinite clay minerals. Clay mineral of caolinite has a low activity with the charge varying pH, which causes a high buffering against changes in pH due to liming and fertilization. Only in the Ap horizon (soil pH 4.8), where there are a lot of humus that can affect and improve the exchange complex, thus the pH value can be increased by one to two units higher than the bottom layer.

Organic C and total N: Organic C remains in topsoils from decomposed litter and crop residues, therefore a sharply decreasing depth function can be observed in most profiles of both soils. The Granite soils contain generally low organic C and total N except in the first two layers. Low organic C and total N are caused by low clay contents of the Granite soils which showed low capacity to hold both elements. In the Basalt soils, total C and total N reach the maximum values in the first two layers and they decrease sharply with depth. Both organic C and total N are very important for soil fertility, especially considering structure and erodibility as well as the ion exchange complexes of the topsoils. The C/N ratios vary in most cases between 6.2 to 10.4 for the Granite soils and 11.4 to 11.8 for the Basalt soils. Organic C and total N decrease both significantly with depth. Here a slight maximum is found at a depth of about 0-10 cm pointing to the fact of organic matter in Ap-horizon.

Cation Exchange Capacity (CEC): The CEC depth function of the Granite soils follows a complex pattern affected by the overlay of two main factors i.e., increasing clay content (with depth) because of increased CEC. Acidification and formation of Al/Fe complexes induce considerable amount of pH-variable charges. But the CEC of all soils is nevertheless very low. Therefore, the soils have to be classified as those with low activity clay ("kandic horizon"). Organic matter seems to have no significant impact on the CEC. The total amount of exchangeable bases decreased generally with depth. The total amount of bases and the relation of Ca.

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Mg, K can be rated as sufficient to well supply for crop production on a high yielding level.

Exchangeable Ca, Mg, and K and Bases Saturation: Exchangeable bases predominantly were found in the Basalt soils and followed by the Granite soils. The dominance of the bases are exchanged in the basalt soils due to the addition of elements from soil parent material rich in dark minerals in the Basalt soils. These bases are very easily washed away as shown by the absence of differences in content of the bases are exchanged in the upper layer with the bottom layer. This means that the soils have low levels of vegetation canopy, so it does not protect the soil from the threat of soil degradation. Base saturation followed the pattern of exchangeable bases, where the basalt soils are more dominant than the granite soils. This is expected because the base saturation is strongly influenced by the bases are exchanged and the exchanged bases decreased due to intensive soil leaching that is responsible for the high value of base saturation in the bottom layer.

Weathering Results of Granite and Basalt Rocks

Mineral weathering of Granite and Basalt rocks can be divided into three groups, namely very slowly soluble minerals such as quartz and muscovite, slowly decayed minerals, namely feldspar and biotite, and easily weathered minerals (augite, hornblende and calcite). When sorted by the order of resistance against the destruction of minerals (sand and silk size), the most resistant minerals are weathered quartz, muscovite, K-feldspar, Na and Ca-feldspar, biotite, hornblende, augite, olivine, dolomite, calcite and gypsum.

The macro and micro nutrients results of rocks weathering can be used as indicators of soil fertility productivity level. The types and kinds of soil nutrients are released by rocks or mineral primers presented in Table 2. Table 2 explains that the quartz mineral was not able to contribute to soil nutrients, calcite and dolomite are able to release Ca and Mg. Dominant black minerals release earth alkaline elements and apatite releases P. Although the dominant parent material can show the level of soil fertility, but the soil characters will ultimately be determined by soil weathering processes and environment. The constituent minerals lost during the destruction took place from the granite rock into clay is very diverse and determined by the constituent minerals of the rock. Mineral constituent CaO, Na_2O, K_2O, MgO and SiO_2 experience a loss of 100 %, 95.0 %, 83.5 %, 74.7 % and 52.5 %, while Fe_2O_3 only lost about 14.4 % (Table 2 and Table 3).

Table 2. Chemical composition of Granite and Basalt rocks

Nr	Chemical composition (% weight)	Granite rocks	Basalt rocks
1	SiO_2	74.0	50.8
2	TiO_2	0.23	2.0
3	Al_2O_3	13.9	14.2
4	Fe_2O_3 + FeO	2.18	11.96
5	MnO	0.05	0.18
6	MgO	0.26	6.3
7	CaO	0.72	10.4
8	Na_2O	3.5	2.2
9	K_2O	5.1	0.82
10	H_2O	0.47	0.91
11	P_2O_5	0.15	0.23
	Total	100	100

Source: Armanto (1992).

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Influences of Soil Parent Materials on Oil Palm Farmer Income

According to management records of both soils received the same treatment in terms of fertilizer, pesticide and other maintenance and same production environment. The difference of soils is strongly influenced only by the soil parent materials (Granite and Basalt). If we continue with laboratory analyses of soil samples, they are different and these differences are reflected also by the performance of Oil Palm FFB presented in Table 4. Table 4 explains that the difference of FFB is around 6.0 ton/ha in a year. This difference was found also by other workers (Wildayana, 2014, Wildayana *et al.,* 2011). This phenomenon indicates that fertilizer application should also consider the soil variability created by the soil parent material. Beside that the both soils still need more input of fertilizer to make the soils more suitable for oil palm growth and development.

Table 3. Average mineral composition of granite and basalt rocks

Nr	Mineral composition (% volume)	Granite	Basalt
1	Quartz	28	1
2	K-Feldspar	35	--
3	Plagioclase	29	51
4	Biotite	5	--
5	Amphibole	1	--
6	Pyroxene	--	39
7	Olivine	--	3
8	Magnetite/Ilmenite/Apatite	2	6
	Total	100	100

Source: Armanto (1992).

Table 4. Fresh fruit bunches (FFB) of oil palm as affected by Granite and Basalt soils

Nr	Soils	FFB (ton/ha in a year)	Operational Cost (Mills Rp/ha in a year)	Farmer Income (Mills Rp/ha in a year)
1	Granite soils	15-18	12.40	19.10-25.40
2	Basalt soils	20-25	12.40	29.60-40.10
	Average	18-25	12.40	24.35-32.75

Explanation: FFB price was Rp 2,100/kg according to FELDA regulation (2014)
Source : Field Survey (2014) and Adzemi (1999).

CONCLUSIONS

Based on mineral resistance to weathering (sand and silt mineral sizes), mineral weathering of granite and basalt is divided into three categories, i.e. very slow weathered mineral (quartz and muscovite), slowly weathered mineral (K-feldspar, Na and Ca-feldspar and biotite), and easily weathered mineral (hornblende, augit, olivine, dolomite, calcite and gypsum). Losing mineral during weathering process from granite to clay is determined by containing mineral in rocks. Such minerals (CaO, Na_2O, K_2O, MgO and SiO_2) loosed 100 %, 95.0 %, 83.5 %, 74.7 % and 52.5 % respectively, but Fe_2O_3 is disappeared only 14.4 %. Soil properties characters of granite soil is more acid, has very low to low chemical soil fertility and is dominated by sand fraction, furthermore basalt soil is acid, has low to moderate chemical soil fertility and is dominated by clay fraction. Granite and basalt soils are able to produce FFB 15-18 ton/ha in a year and 20-25 ton/ha in a year respectively. The production difference of both soils is around 5.0-6.0 ton/ha in a year. The farmer's Income was Rp 19.10-25.40 Mills/ha in a year for Granite soils and Rp 29.60-40.10 Mills/ha in a year for Basalt soils.

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