Preface

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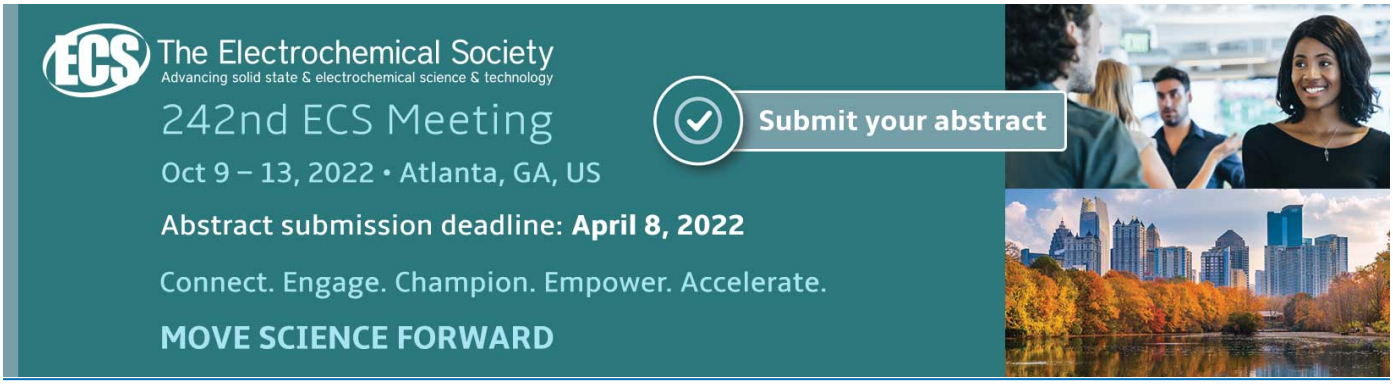

PREFACE

It is a great honour for us to be the host of the 3rd International Conference on Food Security and Sustainable Agriculture in the Tropics (FSSAT) on January 8th – 9th, 2021 at Agriculture Faculty of Hasanuddin University, Makassar City of South Sulawesi Province, Indonesia. This conference is a series of international scientific seminars held by the Faculty of Agriculture, Universitas Hasanuddin, Makassar, Indonesia, which has been held annually since 2017.

This conference was held as a forum for exchanging information on productivist paradigm in Indonesian food policies to feed 260 million people targets the self-sufficiency of rice, sago, corn, soybean, and meat production, including the infrastructure development such as dams, irrigation channels building, and the expansion of paddy and sago fields in the Eastern Indonesia. The unintended outcomes of these efforts are the marginalization of the local food system and dispossession of the local communities from their land and food culture. As a consequence, the human-environmental relationship has changed dramatically posing calamitous disaster and slowly disappearing foodways through local wisdom in everyday life of the local community. It also brings health issues due to the excessive use of chemical agricultural inputs in production, and the increase of degenerative disease and obesity due the unhealthy practices in the consumption level.

The International Conference on Food Security and Sustainable Agriculture in the Tropics will be held every two years, the first in 2017, the second in 2019, and the third in 2021. The covid-19 conditions that have hit the whole world have resulted in restrictions on activities to reduce the spread of Covid-19 sufferers so that the conference model from the form of a live conference has turned into a virtual conference.

The condition of the Covid-19 pandemic has raised concerns about food security throughout the world, including Indonesia, through restrictions on community activities. Several things have implications for the existence of Covid-19, including the occurrence of a very significant supply chain disruption caused by a reduction in capacity to produce food, closing transportation routes so that it will slow down the distribution of food from producers to consumers. The inability of people to consume enough healthy and nutritious food will reduce the immune system and increase disease risk. Thus ensuring an affordable food supply chain is essential during the Covid-19 outbreak. To solve this problem globally, cooperation is needed that involves scientists, academics, practitioners, professionals, governments, entrepreneurs, and communities across countries. To build a network between stakeholders, an international conference held by the Hasanuddin University Faculty of Agriculture in 2021 is important as a forum for building connectivity between researchers and/or research institutions. At this conference, a multi-disciplinary approach based on the knowledge and experience of scientists, researchers, practitioners, and policymakers will be brought together.

If the meeting cannot be held virtually, then solutions in dealing with the food crisis during the Covid-19 pandemic will not find a way out and add to the length of the crisis period chain.

This conference presents keynote speakers from 5 countries, namely Dr. Ir. Bayu Krisnamurthi, M.Si.from IPB University, Indonesia, Prof. Dr. Ir. Sumbangan Baja, M.Phil from Universitas Hasanuddin, Indonesia, Prof. Takuya Sugahara from Ehime Univerity, Japan, Dr. Ravindra C Joshi from CABI South-East Asia, Dr. Lau Wei Hong form University

Putra Malaysia, Mr. Moh, Guo-Jhong from ICDF Taiwan. First plenary session and discussion with 2 speakers for 1 hour and the second plenary and discussion with 3 speakers for 2 hours. For participant presentations (oral presentation and video presentation) it was held in 2 sessions, each session was divided into 10 rooms. The number of participants per room was 11-14 participants with an allocation of presentations for 7 minutes/participants conducted in parallel as many as 7 parallel sessions. Discussions session were held in parallel in each parallel session with an allocation of 3 minutes per participant. Virtual FSSAT 3 implementation using the zoom meeting application by the Faculty of Agriculture, Universitas Hasanuddin has which is obtained by subscription.

The seminar participants were attended by lecturers and students from various universities as well as researchers from various research institutions both from the ministry of agriculture and from Agricultural Technology Research Center. The institution of the participants came from Agricultural Technology Research Center, some polytechnic, institute and University, Indonesian Center for Estate Crops Research and Development, International Coconut Community, Center for Agricultural Technology Research and Development, PT Vale Indonesia Tbk, Sorowako. Some from overseas universities: University of New England, Armidale, Australia, and School of Agriculture and Environment of Massey University, Palmerston North New Zealand. Overall participant numbers around 1.034 participants.

There were no significant technical obstacles, speakers and participants from overseas also presented their papers fluently. Apart from sharing zoom rooms, we also created a social media group (WhatsApp) for each class to facilitate communication between participants and organizers.

All published articles are subject to a rigorous selection process and are peer-reviewed by international and national reviewers. On this occasion, we would like to thank all the authors and the team who have actively participated in the 3rd FSSAT conference, expert reviewers who are very responsive to the technical program committee, experienced senior publication chair, Publication Management Center (PMC) of Universitas Hasanuddin, authors and scholars who are enthusiastic in research. Sincerely thank you for your warm support and look forward to working with you in the next future.

Warm Regards,

Dr. Asmita Ahmad, ST., MSi.

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Faculty of Agriculture, Universitas Hasanuddin

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Peer review declaration

All papers published in this volume of IOP Conference Series: Earth and Environmental Science have been peer reviewed through processes administered by the Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.

- **Type of peer review:**
  Single-blind
- **Conference submission management system:**
  We conduct paper submission through submission management system (http://konfrenzi.com/). The manuscript from author has submitted before the conference through the conference website (https://fssat3.unhas.ac.id/).
- **Number of submissions received:**
  Total received abstract = 364 papers
- **Number of submissions sent for review:**
  355 full papers (19 papers rejected)
- **Number of submissions accepted:**
  291 full papers
- **Acceptance Rate (Number of Submissions Accepted / Number of Submissions Received X 100):**
  79.9 %
- **Average number of reviews per paper:**
  6 papers per reviewer
- **Total number of reviewers involved:**
  47 reviewers
- **Any additional info on review process:**
  There are some steps on review process
  1. Abstract review and acceptance
     At the first stage, abstracts submitted to the committee through the online system available in the website were reviewed by a Scientific Advisory Board/Reviewers for the suitability of the paper's topic to the theme of the conference. Abstracts that suit the theme were accepted and author were notified of the acceptance through the system. Abstract submission and review were conducted simultaneously until abstract submission deadline on October 31, 2020. As many as 364 abstracts submitted through system were reviewed. 1 abstract was rejected as not comply with the theme of the conference. Accepted abstracts were allowed to be presented in an oral or live presentation.
  2. Submission of Full Paper
     At the second stage, authors with abstracts declared accepted by the Scientific Advisory Board/Reviewer and will be presented in the conference were requested to submit a complete manuscript according to the IOP Publishing format. The deadline for receipt of a complete manuscript (full paper) was on December 15, 2020.
  3. Revision of Full Paper
     At the third stage, following the conference that took place on January 8-9, 2021, Authors were requested to revise the full paper according to the input and

suggestions from the conference audiences and re-submit the manuscript through the system until January 31, 2021.

4. Peer review of Full Paper
   At the Fourth stage, full paper previously submitted through system were reviewed following a single blind peer review process. The papers were sent to the Scientific Advisory Boards that consisted of 47 reviewers according to topic of the papers and reviewer's competency. The reviewers are from international scientists and from the Faculty of Agriculture, and Faculty of Animal Husbandry, Hasanuddin University. Review was conducted on content and format of the paper based on IOP Conference Series. The review process was carried out starting from February to March 7, 2021. At this stage, Reviewer submit a decision for the acceptance of the papers for publication in IOP Conference Series.
5. Revision of Reviewed Full Paper
   At the Fifth Stage, Review results were returned to the authors for revision and re-submission online for those accepted for publication (deadline on April 15, 2021). Following the submission of revised manuscript. The submitted papers were then subjected to proofread stage and check for similarity using Turnitin. Papers with similarity check more than 25% were returned to the authors for further revision. Subsequently, papers were prepared for submission to IOP Conference Series.

- **Contact person for queries:**
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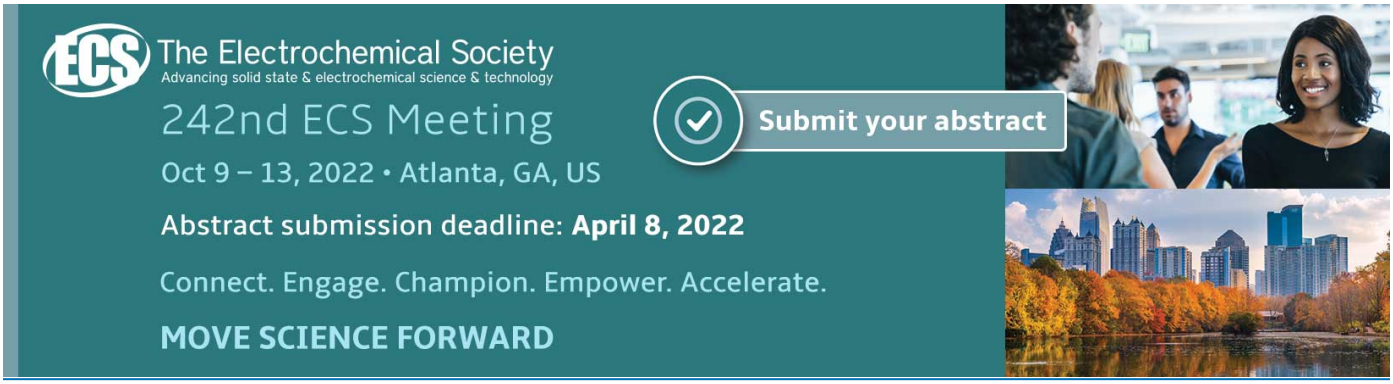
Minerals of parent material as an indicator of soil fertility



Minerals of parent material as an indicator of soil fertility

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Abstract. Soil fertility is the ability of the soil to provide nutrients. Most of the nutrients in the soil come from mineral weathering. The higher of an easily weathered mineral is in line with soil fertility. This research aims to study soil fertility rates based on the mineral content in West Sinjai Sub-district. The methods used in this study are thin sections to identify minerals in the parent material using a polarizing microscope, calculate mineral presentation and nutrient potency classification with the presentation of mineral content minus the presentation of quartz content. The dominant mineral content found is pyroxene, amphibole, and plagioclase that resulted from the andesitic parent material. Soil fertility potential in West Sinjai based on nutrient-carrying minerals is in the range of 80-100% with good criteria. Potential nutrients contained in minerals are already available for plants.

1. Introduction

Soil fertility is the ability of the soil to provide nutrients. Nutrients in the soil come from various sources such as fertilizers, water, organic matter, but most of the soil's nutrients come from the mineral of parent material weathering [1–3]. Minerals contained in the soil are one of the main ingredients of the soil. Minerals types can be broadly differentiated into primary minerals directly formed from the crystallization of magma and secondary minerals resulting from weathering of primary minerals [4]. Mineral composition, both from sand and clay fractions, can be used to indicate the source of origin and properties of the parent material, soil charge, easily weathered mineral reserves as a source of nutrients in the soil, and weathering level or soil development [5].

Minerals in soil have a potential role in agriculture because minerals from rock contain important elements that can be used to maintain and increase agricultural land productivity. The nutrient content in minerals supports the sustainability of soil fertility. Assessment of land potential can be seen from the chemical elements it contains [6]. The higher the easily weathered mineral reserves in the soil, the more fertile the land will naturally, because the land has high nutrient reserves available in the long term through the weathering process.

This research aims to know the mineral contained in the soil is an indicator of soil fertility level. The use of this research is as information material for optimal soil management.

2. Methods

Observation and sampling of parent materials were carried out in West Sinjai District, Sinjai Regency. Analysis of soil minerals and parent material was carried out at the Geochemical and Mineralogy

Laboratory, Department of Geological Engineering, Faculty of Engineering, Hasanuddin University (figure 1). This research was conducted from July 2020 to completion.

The tools used in this research are GPS (Global Position System), a set of survey tools, camera, computer, ArcGIS 10.3, Olympus BX41 type polarizing microscope for parent material minerals. The materials used were samples of the parent material, maps of land units with a scale of 1:50.000.

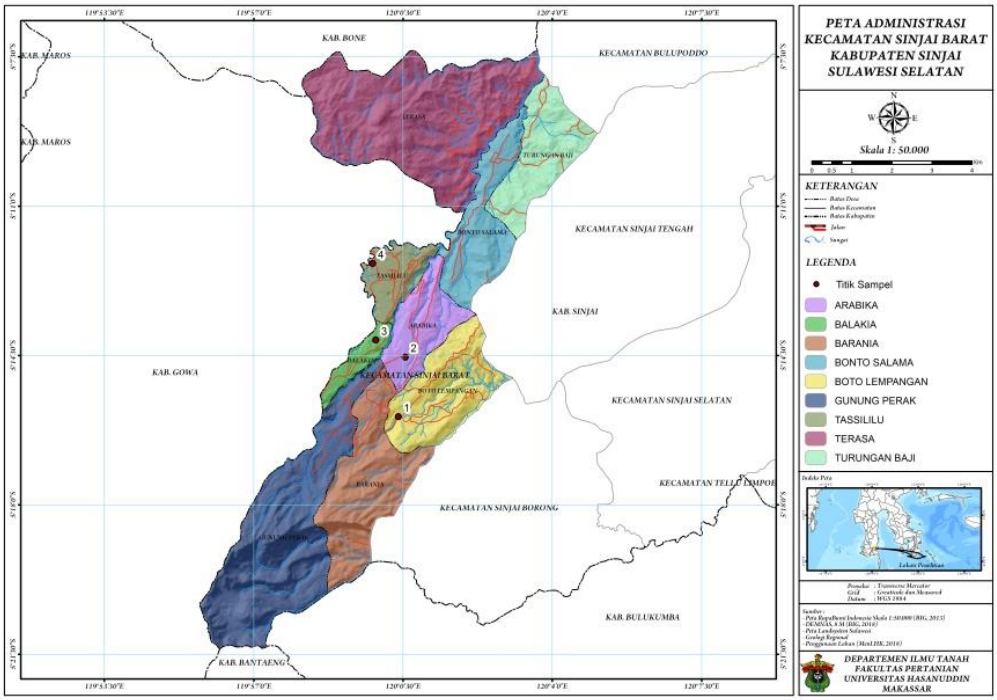


Figure 1. Study site.

2.1 Stages of preparation and mineral identification

Mineral analysis of the parent material was carried out by the petrographic method using the thin-section method [7]. The process of making preparations (thin section) and mineral observation, namely :

a. Impregnating rock samples with epoxy fluids and resin (1:1)
b. Slicing the parent material sample with a size of 0,001-0,003 mm, the incision results were observed using a polarizing microscope.
c. Identify minerals using the Kerr method [8], in cross-polarized (xpl), and plane-polarized (ppl)

2.2 Fertility potential assessment

In this stage, calculating the number of minerals in one field of observation is assumed to be 100% called the mineral counting method, after knowing the results of mineral identification in each parent material. This process includes the percentage of weatherable minerals and resistant minerals. Then, minerals are presented. According to [9], the method of assessing nutrient reserves in the soil is necessary to know. Apart from Soil Taxonomy, quartz mineral differentiation is carried out in estimating weathered mineral content (nutrient reserves), namely :

$$\boldsymbol{Nutrient\ reserves = 100 - \%quartz}$$

After knowing the percentage of weathered minerals, assessing the potential for soil fertility is carried out by looking at the criteria in assessing the potential for soil fertility (table 1).

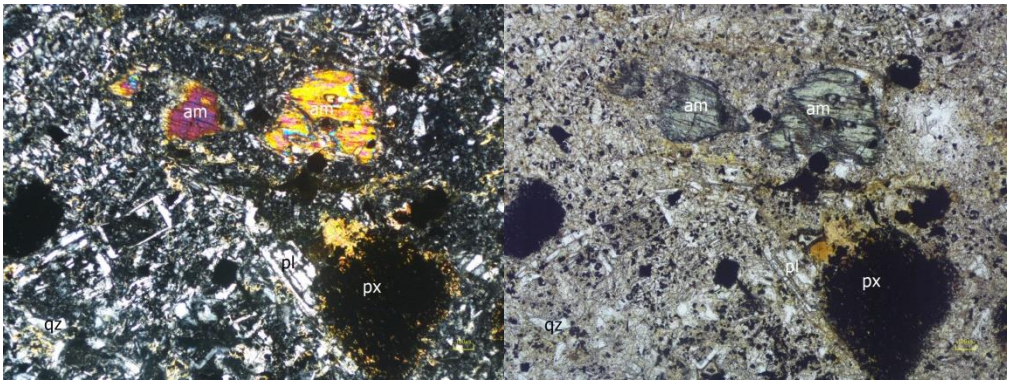
Table 1. Fertility potential assessment criteria.

Weathered Minerals	Term
100% - 70%	Good
70% - 40%	Moderate
40% - 0%	Low

Source : [9]

3. Results and discussion

The parent material found at the research site was andesitic, which was dominated by plagioclase, pyroxene, and amphibole minerals (figure 2). According to the opinion of [10], plagioclase and pyroxene or hornblende (amphibole) are the main mineral characteristics in andesitic igneous rocks. At observation point 1, the parent material's minerals are amphibole, plagioclase, pyroxene, and quartz. In xpl, amphibole has a striking color variation, plagioclase is white, pyroxene is golden brown, and quartz is clear white. In ppl, its parallel to amphibole has a greenish color, plagioclase is colorless, pyroxene is a brownish color, and quartz has a pure white color.



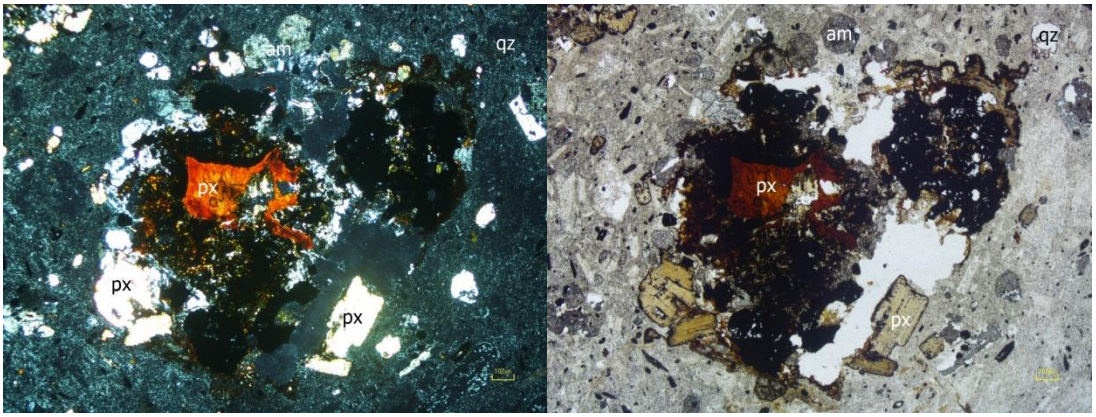
a. xpl b. ppl

Figure 2. (a) thin section of the parent material at the xpl observation consist of am (amphibole), pl (plagioclase), px (pyroxene), and qz (quartz). (b) thin section of the parent material at the ppl observation consist of am (amphibole), px (pyroxene), qz (quartz). (size 100µm).

Based on the identification of minerals in the parent material at the xpl observation, the percentage of amphibole mineral content was 40%, pyroxene minerals were 20%, plagioclase minerals were 20%, and quartz was 20%. The main material of xpl observation has weathered minerals: amphibole, pyroxene, and plagioclase, with the percentage of weathered mineral content, was 80%. So, the parent material at the xpl observation can be categorized as having good soil fertility because it has high nutrient reserves. This is supported by [11], who states that minerals such as plagioclase, amphibole, and pyroxene are classified as easily weathered minerals that release macronutrients into the soil such as Ca, Mg, Na, and K.

At ppl observation point 2 (figure 3), the pyroxene minerals with red color on the xpl and red also on ppl. There is also pyroxene with a white color on the xpl and brownish color on ppl. Amphibole has a greenish color on the xpl and pale green on ppl. In xpl, the quartz appears black, but in ppl, the quartz has a pure white or transparent color [8].

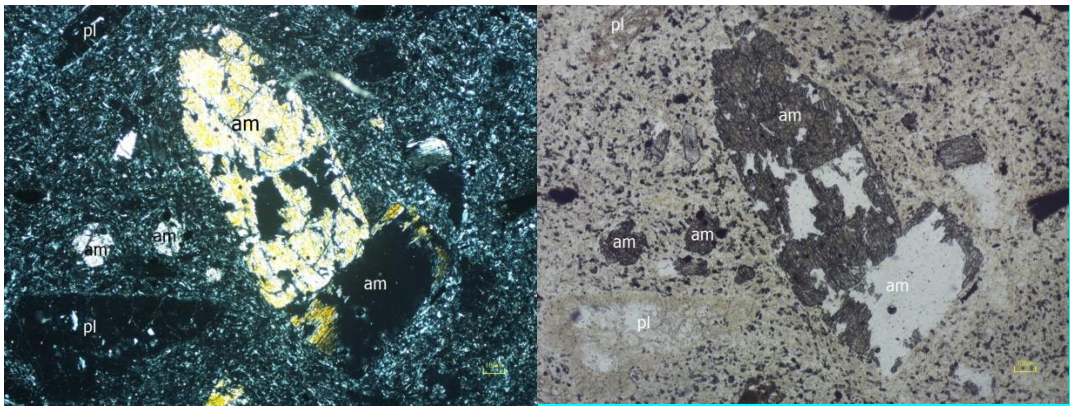
The identification of minerals in the parent material at the xpl observation, the percentage of amphibole mineral was 20%, pyroxene mineral was 60%, and quart mineral was 20%. The main material of xpl observation has weathered minerals, namely amphibole and pyroxene, with the percentage of weathered mineral content was 80% which is dominated by pyroxene minerals. So, the parent material at the xpl observation can be categorized as having good soil fertility because it has dominant reserves of Mg nutrients from pyroxene minerals. This is supported by [12], who state that Mg's source is the pyroxene group (augite).



a. xpl b. ppl

Figure 3. (a) thin section of the parent material at the xpl observation consist of am (amphibole), px (pyroxene), qz (quartz), (b) thin section of the parent material at the ppl observation consist of am (amphibole), px (pyroxene), qz (quartz). (size 100µm).

At ppl observation point 3 (figure 4) there are amphibole minerals with brownish and white colors on xpl and pale brown on ppl. Plagioclase has black and white patches on the xpl and colorless on ppl [8].

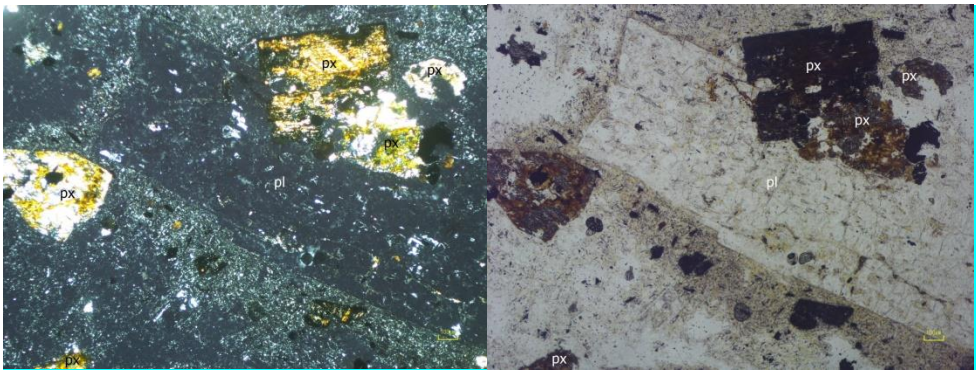


a. xpl b. ppl

Figure 4. (a) thin section of the parent material at the xpl observation consist of am (amphibole), pl (plagioclase), (b) thin section of the parent material at the ppl observation consist of am (amphibole), pl (plagioclase). (size 100µm).

Based on the identification of minerals in the parent material at the xpl observation, the amphibole mineral percentage was 66,7%, and plagioclase mineral was 33,7%. The main material of xpl observation has weathered minerals, namely amphibole and plagioclase, with the percentage of weathered mineral content was 100%. The parent material at the xpl observation can be categorized as having good soil fertility because having weathered mineral content was 100%.

At ppl observation point 4 (figure 5), pyroxene minerals with brownish yellow color were found on cross nicol and parallel nicol. Plagioclase has a black color with white patches on the xpl and colorless on ppl [8].



a. xpl b. ppl

Figure 5. (a) thin section of the parent material at the xpl observation consist of px (pyroxene), pl (plagioclase), (b) thin section of the parent material at the ppl observation consists of px (pyroxene), pl (plagioclase). (size 100µm).

Based on the identification of minerals in the parent material at the xpl observation, the percentage of pyroxene mineral was 83,3%, and plagioclase mineral was 16%. The main material of xpl observation has weathered minerals, namely pyroxene and plagioclase, with the percentage of weathered mineral content was 100% dominated by pyroxene minerals. So, the parent material at the xpl observation can be categorized as having good soil fertility because it has dominant reserves of Mg and Ca nutrients from pyroxene minerals. This is supported by [13], who state that the pyroxene mineral is a mineral carrying calcium and magnesium nutrients.

The level of soil fertility can be seen based on the weathered mineral of the parent material. When the mineral of the parent material was weathered, the nutrient elements contained will be available in the soil to become nutrient reserves for plants. Assessment of potential fertility based on nutrient reserves from the mineral of parent material is presented in table 2.

Table 2. Soil fertility potential from the mineral of parent material.

Observation Point	Quartz Content (%)	Weathered Mineral (%)	Criteria
1	20	80	Good
2	20	80	Good
3	-	100	Good
4	-	100	Good

The soil fertility level from the weathered mineral of parent material has a good criterion. The weathered mineral around 80-100% dominated by amphibole mineral, pyroxene and plagioclase mineral.

4. Conclusions

The parent material at the research location is andesitic rock and dominated by pyroxene, amphibole, and plagioclase minerals. These minerals are nutrient-carrying minerals for Ca, Mg, K, and Na for the plant. The potential of soil fertility in West Sinjai District is 80-100% with good criteria. Potential nutrient elements contained in minerals are readily available to plants.

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