THESIS

CORN PLANT N Absorption (Zea *mays* L. *)* DUE TO THE PROVISION OF PELLET FERTILIZER MATERIALSCOAL FLY ASH, AZOLLA BIOMASS AND UREA ON ULTISOL

NITROGEN UPTAKE OF MAIZE PLANT (Zea mays* L. *) ASRESULT OF THE APPLICATION OF PELLETS FERTILIZER MADE OF FLY ASH, AZOLLA BIOMASS AND UREA ON ULTISOL

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SUMMARY

NOVIA NURKHALIZA. Nitrogen Uptake of Maize Plant (*Zea mays* L.) As Result of The Application of Pellets Fertilizer Made of Fly Ash, Azolla Biomass and Urea on Ultisol (supervised by **AGUS HERMAWAN** and **ADIPATI NAPOLEON).**

One of the ways to fulfill the nitrogen needs of maize plant is by adding urea fertilizer. But in fact, a large amount of nutrients from urea can not be absorbed by plants because the properties of urea are hygroscopic and easily leached. In this study, the efforts were conducted to increase N uptake of maize plants from urea fertilizer by modifying urea fertilizer to be pellets with additional composition of fly ash and azolla biomass. The research was arranged in a Completely Randomized Design with 9 treatments and 3 replications which analyzed variance and orthogonal contrast. The treatment which was applied was kontrol (K), pellet fertilizer compossition (fly ash: azolla): urea (50:50) 70:30 (P-A) at a dose of 100% (P-A1), dose 75% (P-A2) and dose 50% (P-A3), pellets compossition (fly ash: azolla): urea (40:60) 70:30 (P-B) with a dose of 100% (P-A1), dose 75% (P -A2) and dose 50% (P-A3) and urea fertilizer with 100% dose and 1 times the application frequency (U-A). Urea fertilizer with 100% dose and 3 times the application frequency (U-B). The results showed that treatments had a very significant influence on the weight of dry stover and N uptake of maize plant, had significant effect on the leaves number and N content of maize plant, but did not have significant effect on the content of K, Ca, Mg, Na and pH H_2O soil during the maize plant anthesis phase. N uptake, number of leaves, dry stover weight and N content of maize plant anthesis phase of the treatment pellet fertilizer was significantly higher than those of urea fertilizer.

Keywords : Azolla biomass, Fly ash, Maize plants, Pellets fertilizer, Urea

RINGKASAN

NOVIA NURKHALIZA Absorption N Plant Corn (*Zea mays* L.) Consequence Giving Pellet Fertilizer Made from Coal Fly Ash, Biomass Azolla and Urea on Ultisol (guided by **AUGUST HERMAWAN** and **DUKE NAPOLEON).**

Wrong one method for Fulfill needs nitrogen plant corn that is with addition fertilizer urea. However in fact, amount big hara nitrogen from fertilizer urea no could absorbed plant because nature urea which hygroscopic and easy to leach. In this study, efforts were made to increase absorption N plant corn from fertilizer urea that is with modifying urea fertilizer in the form of pellets by being given a mixture of materials in the form of coal fly ash and azolla biomass. This research uses the Design Completely Randomized (CRD) with 9 treatments and 3 replications analyzed for variance (F test) and contrast orthogonal follow-up test. The treatment applied is Control (K), mixed pellet fertilizer (coal fly ash: azolla): urea composition (50:50) 70:30 (PA) with a dose of 100% (P-A1), a dose of 75% (P-A2) and a dose of 50% (P-A3) as well as mixed pellet fertilizer (coal fly ash: azolla): urea composition (40:60) 70:30 (PB) with a dose of 100% (P-A1), a dose of 75% (P-A2) and a dose of 50% (P-A3). Urea fertilizer with a dose of 100% and the frequency of application is 1 time (UA). Urea fertilizer with dose 100% and frequency application 3 time (UB). Results study show that all treatment take effect very real to heavy safe dry and absorption N plant, only take effect real to amount leaf and rate N plant however, take effect no real to content of K, Ca, Mg, Na and pH H_2O of the soil during the anthesis phase of corn plants. The treatment of pellet fertilizer was significantly higher than urea fertilizer on uptake N plants, number of leaves, dry weight of stover and N content of phase corn plants anthesis.

Say Key : Ash fly coal, Azolla, Fertilizer pellets, Plant Corn, Urea

THESIS

CORN PLANT N Absorption (Zea *mays* L. *)* DUE TO THE PROVISION OF PELLET FERTILIZER MATERIALSCOAL FLY ASH, AZOLLA BIOMASS AND UREA ON ULTISOL

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2019

LEMBAR PENGESAHAN

SERAPAN N TANAMAN JAGUNG (*Zea mays* L.) AKIBAT PEMBERIAN PUPUK PELET BERBAHAN ABU TERBANG BATUBARA, BIOMASSA AZOLLA DAN UREA PADA ULTISOL

SKRIPSI

Sebagai Syarat untuk Mendapatkan Gelar Sarjana Pertanian
pada Fakultas Pertanian Universitas Sriwijaya

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RIWAYAT HIDUP

The author's full name is Novia Nurkhaliza. The author was born on 02 November 1997 in Sungailiat, Bangka Belitung. The author is the third child of three brothers. The author's parents, father named Muhammad Taufiq and mother named Herlina.

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KATA PENGANTAR

Praise gratitude presence God S.W.T. which has give grace and his gift so that could complete Thesis which title “Absorption N Corn Plants (*Zea mays* L.) Due to the Application of Pellet Fertilizer Made from Ash Fly Coal, Azolla Biomass and Urea on Ultisol."

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Saying accept love also writer convey to second person old onprayer and Support good by Theory and non Theory to writer so thatthe writer can finish this thesis well. Thank you also writer say to the writer's sister and sister Ratu Balkis who always give motivationand ideas in writing this thesis.

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Hopefully this thesis can contribute ideas that beneficial for us all.

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Writer

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BAB 1
PRELIMINARY

1.1. Background The back

Plants need nutrients, especially nitrogen (an essential nutrient) in amount relatively big on every phase growth, specifically on Step vegetative growth, such as shoot formation, root development, stem and leaves (Rosmarkam and Yuwono, 2002). One way to meet the needs nitrogen of a plant by the addition of urea fertilizer ($CO(NH_2)_2$. Urea is a source of high levels of nitrogen (N) (46%) and the most widely used by farmers because the price is affordable and easy to obtain (Purwandi, 2011). However, urea has the disadvantage of having high hygroscopic properties and easy leached moment applied (Sari, 2013). According to Purwono and Hartono (2008) on plant paddy, lost nitrogen from urea range 60-80%, whereas on plant palawija, loss of nitrogen from urea ranged from 40-60%.

The high nitrogen loss from urea is caused by the rapid hydrolysis which catalyzed by urease (Zuraida, 2014). According to Rosmarkam and Yuwono (2002), denitrification is also the cause of N loss by altering NO_3^- with the help of denitrifying bacteria (anaerobes) into N_2 which evaporates (*votalization*) in air. If there is no technological breakthrough to overcome this, it will disturbing food safety, one of them production corn (*Zea mays* L.).

Directorate General Plant Food (2015) set target production corn for year 2016-2019 that is increase as big as 4-5% per year. For To meet the production target, fertilizer inputs are given in the form of urea fertilizer. On in fact, amount big hara from fertilizer urea no could absorbed plants and is lost to the environment, so it needs to be given several times over period grow plant. Phenomenon this no only cause loss resources and economy, but also causes environmental pollution problems which serious (Trenkel, 2010).

Therefore, we need an effective nutrient control for cultivation corn plants so that the availability of nutrients which is easily lost (nitrogen in urea) can be overcome. Several attempts have been made, such as Hariyati 's research (2017) which utilizes bagasse fly ash (remains of the sugar industry) as a matrix fertilizer free slow urea so that could increase heavy fresh, heavy dry, N uptake in roots and N uptake in maize leaves. In addition to research Zuraida (2014) stated that the use of *slow release* urea fertilizer (sago-abu rice husk-urea) had a significant effect on height, stem diameter, N uptake and efficiency maize N uptake.

In this study, efforts were made to slow down the release of N from urea, namely by modifying urea fertilizer in the form of pellets by giving a mixture of materials in the form of coal fly ash and azolla biomass. Fertilizer form pellets are used because they have the advantage of being able to reduce the volume of 50-80%, effective for long-distance transportation models, does not generate dust and is *slow release* or nutrient release by slowly (Hara, 2001).

Coal fly ash was chosen as a mixture for making pellet fertilizer because it Coal fly ash contains silicate which is able to bind ammonium so it's not easy to wash. Coal fly ash has the pore cavity similar with zeolite capable trap $NH4^{+}$. _ Advantages other ash fly coal is nature which is like cement so that it can strengthen the power tie. Study previously explain that enhancement dose ash fly coal as coating fertilizer urea correlated positive in lower solubility, increase the hardness of briquettes and decrease the release rate of ammonium (Anggono, 2018).

In addition to coal fly ash, other materials for making fertilizer pellets are raw materials nitrogen-rich organic matter, namely azolla biomass. Hermawan *et al* . (2018) state results analysis chemical biomass azolla have content nitrogen as big as 1.85% with the availability also overflow and easy to cultivate.

Report results study Hermawan *et al* . (2018) about test scale laboratories applying various compositions of coal fly ash, biomass azolla and fertilizer urea for making fertilizer briquettes, show that composition (50:50)70:30 ((Composition of 50% coal ash and 50% azolla biomass) used as much 70% with mixture fertilizer urea as much 30%) and (40:60)70:30 ((Composition of 60% coal ash and 40% azolla biomass) is used as much as 70% with a mixture of urea fertilizer as much as 30%) tend to have physical characteristics, dissolving characteristics and Better N-total than composition another.

Based on the results of previous studies, it is necessary to test fertilizers made from ash fly coal-biomass azolla-urea this for study the effect to absorption nitrogen plant which cultivated. For that, Greenhouse scale research was conducted by applying fertilizer dose treatment pellets made from coal fly ash-biomass azolla-urea and urea fertilizer. Plantindicator used is a plant corn planted on Ultisol.

1.2. Destination

1. For learn influence treatment to absorption N plant corn onUltisol.
2. For learn difference Among treatment control, fertilizer pellet and fertilizer urea to N uptake of corn plants in Ultisol.

1.3 Benefit Study

Study this expected could Becomes wrong one effort for reduce use dose fertilizer urea with utilise fertilizer pellet made from ashfly coal, biomass azolla and urea in management Ultisol for cultivation corn plant.

1.4 Hypothesis

1. Allegedly gift treatment take effect real to absorption N plantcorn on Ultisol.
2. Allegedly absorption N plant corn on treatment fertilizer pellet more tall from fertilizer urea.

CHAPTER 2
OVERVIEW
REFERENCES

2.1 Soil Characteristics Ultisol

Ultisol is one type of soil in Indonesia which has a distribution area, reaching 45,794,000 ha or about 25% of the total land area of Indonesia. In In South Sumatra, the Ultisol distribution area reaches 1,270,000 hectares (Subagyo *et al* ., 2004).

According to *the Soil Survey Staff* (2010), Ultisol is a soil that has level development which enough carry on, characterized by cross section soil whichdeep, the clay fraction increases with soil depth, has a horizon argillic or kandic horizon, acid soil reaction (pH 3.10-5.00), and base saturation low (<35%). Generally, Ultisols are brownish yellow to red, the color of soils in the argillic horizon vary widely with hues from 10YR–10R, values 3-6 and chroma 4-8.

Use Ultisol for interest agriculture faced on a number of serious problems such as high acidity, high levels of organic matter low, lack of essential nutrients for plants, such as N, P, Ca, Mg and Mo, and the high solubility of Al, Fe and Mn. This reflects the low quality the soil which will eventually inhibit plant growth and production (Revelations, 2009).

Purwani *et al 's research results* . (2013) demonstrated the nature of the Queen's State Ultisol, Lampung has a dusty clay texture, is acidic, contains organic matter and N is low. The content of P and K is classified as medium and base saturation including currently.

Results analysis nature physique and chemical Ultisol according to Wahyudi (2009) show that soil Ultisol textured clay with permeability slow. Whereas nature chemical characterize pH low (4.59), C-organic very low (0.86%), N-total and CEC were very low with values of 0.09% and respectively 4.13 me 100 g^{-1} , whereas saturation Al including tall (41.29%) with content Al-dd as big as 2.30 me 100 g^{-1} and H-dd of 1.69 me 100 g^{-1} .

In general, the plants grown in Ultisol deliver production which good on a number of year first, During elements hara in surface soil which collected through process *biocycle* not yet finished. Reaction soil which sour, low base saturation, high Al content, low nutrient content is blocker main for growth and production plant. For agricultural uses, liming, fertilization, and proper land management (Trihutomo, 2011).

2.2. Nitrogen

Nitrogen is a nutrient that is needed by plants in large amounts the big one. The role of nitrogen includes the formation of chlorophyll, protoplasm, protein and nucleic acids. Sources of N mostly come from the air. Microorganisms symbiotic with plants (*Leguminose*) bind N from the air then converted to forms available to plants, namely NH_4^+ and NO_3^-. apart from air, the source of N comes from rotting plant residues and artificial fertilizers like urea and NPK (Rosmarkam and Yuwono, 2002).

The nitrogen biogeochemical cycle consists of five processes, namely ammonification, nitirification, assimilation nitrogen, denitrification and fixation nitrogen. Ammonification is process formation of ammonia from organic matter. Ammonia can also be assimilated into amino acids and can be assimilated directly by algae and plants. Nitrification is an oxidation reaction that is the process of forming nitrate from ammonia. Process this could in progress by biological nor chemical. Denitrification is reduction nitrate Becomes nitrite, nitrite oxide and gas nitrogen. Fixation Nitrogen is the fixation of nitrogen gas into ammonia and organic nitrogen (Hastuti, 2011).

The role of the element nitrogen is no doubt for plant growth. deficiency or advantages N will lead to growth plant hampered. Deficiency of N elements or known as N deficiency has the main characteristics: which is seen in the leaves, namely yellowing (chlorosis), this situation is different from Normal leaves are dark green which means they contain high chlorophyll. The process of yellowing the leaves of plants that lack N starts from the leaves that are old and will continue to young leaves if N deficiency continues. Incident This shows that N is very mobile, meaning that if there is a shortage of N then N in old tissue will be mobilized to young tissue (growing point) so that in old tissue chlorosis occurs and in young tissue it continues to grow normal i.e. colored green (Purwadi, 2011).

Element nitrogen required for formation or growth part vegetative plant, like leaf, stem and root. Element N play a role for accelerate the vegetative phase because the main function of element N is the synthesis of chlorophyll. Chlorophyll working for catch light sun which useful for formation of food in photosynthesis, sufficient chlorophyll content can shape or spur growth plant especially stimulate organ plant vegetative. Root, stem, and leaf growth occurs rapidly if supply food which used for process formation organ the in sufficient condition or amount (Purwadi, 2011).

Determination of the amount of nitrogen (N-total) contained by a material is measured using the *Kjeldahl method* . N-organic and NN_4 contained in the sample was destroyed with sulfuric acid and *selenium mixture* to form ammonium sulfate, is distilled off with the addition of excess base and finally the distillate is titrated. Nitrogen in the form of nitrate is extracted with water, reduced by *devarda alloy* , distilled and finally titrated (Soil Research Center, 2009).

2.3. Ingredient Fertilizer Pellet

Report results study Hermawan *et al* . (2018) about test scale laboratories applying various compositions of coal fly ash, biomass azolla and fertilizer urea for making fertilizer briquettes, show that composition (50:50) 70:30 ((Composition of 50% coal ash and 50% azolla biomass) used as much as 70% with a mixture of urea fertilizer as much as 30%) and (40:60) 70:30 ((Composition ash coal 60% and biomass azolla 40%) used as much as 70% with a mixture of urea fertilizer as much as 30%) tend to have characteristics physique, characteristics dissolving and indicates will could release hara from fertilizer urea more slow compared to composition which other. Research Hermawan *et al* . (2018) also mentions the levels of total N contained in on composition briquettes (40:60) 70:30 that is as big as 8.82% and rate N-total composition briquettes (50:50) 70:30 by 10.75%.

The fertilizer used in this study was in the form of pellets. Fertilizer These pellets are made from a composite of coal fly ash, azolla biomass and urea. The composition of the pellet fertilizer used was (50:50) 70:30 coal fly ash- azolla 70% (50:50) + urea 30% and (40:60) 70:30 coal fly ash-azolla 70% (40:60) + 30% urea. Pellet form of fertilizer is used because it has advantages, namely: can reduce volume up to 50-80%, effective for long-distance transportation modelsand storage, no produce dust, and character *slow release* or release nutritionally slowly (Hara, 2001).

2.3.1. Urea

Urea is a nitrogen fertilizer that has been around for a long time and is widely used for increase results production plant food. Efficiency absorption fertilizer urea in area tropical by plant paddy ricefield relatively low 30-50%. Thing this shows that more than 50% of the applied fertilizer cannot be taken by plant paddy (Wisdom, 2006). Efficiency fertilizer urea which low the caused by lost consequence denitrification, washing, carried away Genre surface and volatilization. According to Purnomo and Hartono (2008) on plants paddy, lost nitrogen from urea range 60-80%, whereas on plant palawija, loss of nitrogen from urea ranged from 40-60%.

Lost nitrogen from urea which tall caused by hydrolysis which catalyzed by urease, washing, carried away Genre surface and volatility (Zuraida, 2014). Novizal (2005) explain part big nitrogen absorbed in the form of NO_3^-, but NO_3^- more easily washed by water towards the coating on below the root area so that it cannot be utilized by plants. According to Rosmarkam and Yuwono (2002), denitrification is also a cause of loss of N by changing NO_3^- with the help of denitrifying bacteria to N_2 which evaporate in the air.

Urea is a hygroscopic fertilizer at 73% humidity. For could absorbed by plants, nitrogen in urea must first be converted to ammonium with help enzyme urease through process hydrolysis. However, when given to soil, process hydrolysis the will fast very occur so thateasy evaporate as ammonia. Giving urea with distributed will fast hydrolyzed (within 2-4 days) and it is susceptible to loss through volatilization (Sari, 2013).

The process of N loss can be reduced by modifying the physical form and chemical fertilizer urea so that expected could slow down process hydrolysis. Making fertilizer urea in form size details big could increaseavailability of fertilizer so that it can last longer and is widely absorbed by plants and less lost compared to urea pril. Some examples new forms of urea such as super granule urea and urea briquettes are applied with method immersed deep 15 cm of layer above (Hikmah, 2006).

Other attempts have been made to slow the release of nitrogen from urea, namely by modifying urea fertilizer into slow fertilizer available from ingredient urea-zeolite-azam humate (Sari, 2013), coating urea use sago-rice husk ash (Zuraida, 2014), urea coating using zeolite in granular form (Poerwadi, 2005) and the use of bagasse fly ash as a matrix fertilizer slow release urea (Hariyati, 2017).

2.3.2. Ash Fly Coal

Process burning coal produce many product remainder or which known as coal waste. One of the wastes generated from burning Coal is fly ash. Fly ash is a solid waste produced from burning coal in power plants. This solid waste is in quite large quantities. The amount of fly ash produced is about 15% - 17% of every one tonne of coal burning. The amount is quite large, so need processing which is more continued (Safitri *et al* ., 2009).

Chemically, coal fly ash is an aluminosilicate mineral which contains many elements such as Ca, K, and Na in addition to small amounts of elements C and N. Other nutrients in coal fly ash needed in the soil for plants including Boron (B), phosphorus (P) and trace elements. elements such as Cu, Zn, Mn, Mo and Se. Generally, coal fly ash is alkaline (pH 8-12). Physically, coal ash has a particle size of sized *silt* and have characteristics capacity fastener water from currently until tall (Kurniawan, 2014).

Ash fly coal contain element hara which needed plant. Based on the results of Achmad's research (2016), it is known that fly ash has a N-total (0.20%), P-Available (8.25 mg kg^{-1}), SiO2 _ (36.88 $cmol_{(+)}$ kg^{-1}), CaCO3 _ (27.40%), pH H2O _ _ (8.60), pH KCl (8.38), C-organic (0.83%), and Kindergarten 26.10 ($cmol_{(+)}$ kg^{-1}) . According to Wong (1997), soil that is mixed with 35% fly ash and household waste with a ratio of 1:1 ($^{V}/_{V}$) provides an increase yield on plant growth. So it can be said that fly ash and waste household have potential for utilization on field agriculture.

Based on the results of the analysis in the research of Hermawan *et al* . (2013) coal ashis basic (pH 8.75), with a very low K-dd level (0.06 $cmol_{(+)}$ kg^{-1}), low Ca-dd (4.80 $cmol_{(+)}$ kg^{-1}), very high Na-dd (2.72 $cmol_{(+)}$ kg^{-1}) and Mg-dd is very high (21 $cmol_{(+)}$ kg^{-1}), as well as the levels of C-organic and N- total which is also classified as very low with successive values of 0.11% and 0.04%. Beside that, ash fly coal which used dominated by dust-sized particles (56.13%) with the rest of the particles consisting of clay (15.07%) and sand size (28.80%).

Coal fly ash is an inorganic mineral that can be used as a ingredient coating fertilizer urea. Ash fly coal with content the silicate able to bind ammonium so it is not easily washed. Coal fly ash have cavity pore which similar with zeolite capable trap $NH4^{+}$. _ Another advantage of coal fly ash is its cement-like nature capable strengthen power tie. Study previously get that increasing the dose of coal fly ash as a urea fertilizer coating correlated positive in lower solubility, increase violence briquettes and lower ammonium release rate (Anggono, 2018).

2.3.3. Biomass Azolla

Organic matter can be a mixture of ingredients for making slow-release fertilizers because of organic can bind nutrients from fertilizers into the humic structure through chemical reactions directly or indirectly with activity microbiology and microbial biomass decomposition (Sulakhudin *et al* ., 2011).

Quality ingredient organic said tall if content N tall, content lignin and polyphenol which low so that process release element nutrients quickly and coincided with the time the plant needed. On the contrary quality ingredient organic said low when content N low as well as content lignin and high in polyphenols. This will result in the process of releasing nutrients walk slow and takes time long time (Yuwono, 2008).

One of the potential sources of organic matter with high quality is azolla. Azolla is a type of aquatic fern that floats and is very susceptible to condition environment which dry. Azolla symbiosis with *Anabaena azollae* and capable produce content nitrogen through fixation process. Azolla nitrogen fixation process for a period of 106 DAP reached 120-140 kg N ha^{-1} or an average of 1.1-1.3 kg N ha^{-1} day^{-1} . Nitrogen fixation results the transferred to whole part Azolla's body (Arifin, 2003). According to Ferentinos *et al.* (2002), azolla lignin content is 20%, CN ratio is 10 and tissue N levels ranged from 2-6.5%. Under flooded conditions, 40-60% of N azolla is released after 20 days and 55–90% is released after 40 days application.

Azolla could used as source nutrition for plant because in inside contain element hara macro and element hara micro. According to Djojosuwito (2000) content element hara macro azolla based on percentage dry weight is element nitrogen (N) by 4-5%, phosphorus (P) 0.5-0.9%, potassium (K) 2 – 4.5%, calcium (Ca) 0.4 – 1%, magnesium (Mg) 0.5 – 0.6%. While the micro nutrients in the form of ferum (Fe) 0.06 – 0.26% and manganese (Mn) 0.11 – 0.16%. In addition to containing nutrients, Azolla also contains acid humate which could hinder activity enzyme urease. Sour humate could reduce the release of nitrogen through evaporation so that the availability of nitrogen in the ground increases (Vaughan and Ord, 1991; Anggono, 2018).

Based on Hermawan *et al* . (2018) which evaluates several characteristics physics of briquette fertilizers on various compositions of coal fly ash-azolla and urea, showed that a decrease in the proportion of azolla biomass tends to increase compressive strength and filling density, and tends to decrease the water holding capacity and porosity fertilizer briquettes which generated. Whereas on results analysis chemical, Azolla biomass has a C-organic content of 13.38%, nitrogen of 1.85%, phosphorus 0.06% and potassium by 1.88%.

2.4. Absorption N Plant

Nutrient uptake is the amount of nutrients that enter the plant tissue obtained based on the results of plant tissue analysis (Turner and Hummel, 1992). The benefits of nutrient uptake, among others, are to determine the efficiency of fertilization, knowing the need for nutrients in the plant body, knowing the transport of nutrients in plants, knowing the nutrient balance in a land and considerations in make fertilizer recommendations. The formula for calculating nutrient uptake is nutrient levels (%) x heavy dry stove (g) (Wahyudi, 2009) **.**

Nitrogen absorbed by plant in form NO_3^- and $NH4^+$. _ Amount depending on soil conditions, more nitrates are formed when the soil is warm, moist, and aeration good. Absorption nitrate more many on pH low whereas ammonium at neutral pH. Nitrate compounds generally move towards the roots because mass flow, while ammonium compounds because they are immobile so that besides through mass flow also through diffusion (Roesmarkam and yuwono, 2002)

Turner and Hummel (1992) stated that nutrients that cannot be absorbed by plant could caused is lost because late in infiltration, evaporate, carried away water runoff and erosion, trapped in areas that are not accessible to plants, taken by microbes or settle in the ground.

According to Hardjowigeno (2010) changes nitrogen in soil could cause availability element nitrogen which could utilized by plants and also loses nitrogen from the soil. The ammonification process produce ion NH4 $^{+}$ and _ nitrification which produce ion NO_3^- in soil by microorganisms can support the availability of nitrogen in the soil which can be used by plants. The loss of N from the soil can occur because a number of Thing of them that is used by plant that alone or microorganism, N in form NH_4^+ can tied by mineral clay type *illit* so that no could utilized by plant, N in form NO_3^- easy washed by rain water and the last is the denitrification process. Efforts that could conducted for increase absorption plant Among other with give fertilize (dose, form, time, method).

The results of Zuraida's research (2012), show that urea and urea are *slow release* (sago-rice husk-urea) had a very significant effect on dry weight, significant effect on N levels and very significant effect on absorption N corn plants at the age of 30 DAP. The highest N uptake was found in the treatment 1.5 grams urea *slow release* and absorption Lowest there is on treatment 2 gramsurea prill.

Haryati research report (2017), about the experiment of slow release fertilizer nitrogen (urea fly-bagasse- molasses) with maize plant Indicator on Bugel Kulonprogo beach sand soil, indicating that the fertilizer treatment was loose slowly at a dose of 50% of the recommendation with an application depth of 5 cm can increased fresh weight, dry weight, N uptake in roots, and N uptake in leaf.

Enhancement absorption N plant there is the relationship with enhancement heavy dry plant, repair development root plant, and enhancement availability of soil N. Increased plant development (top dry weight and root dry weight) is related to the improvement of soil conditions (increase in pH soil). Thing the will cause enhancement ability root plant for absorb water and element hara N in soil which on turn will support enhancement plant development (Wahyudi, 2009).

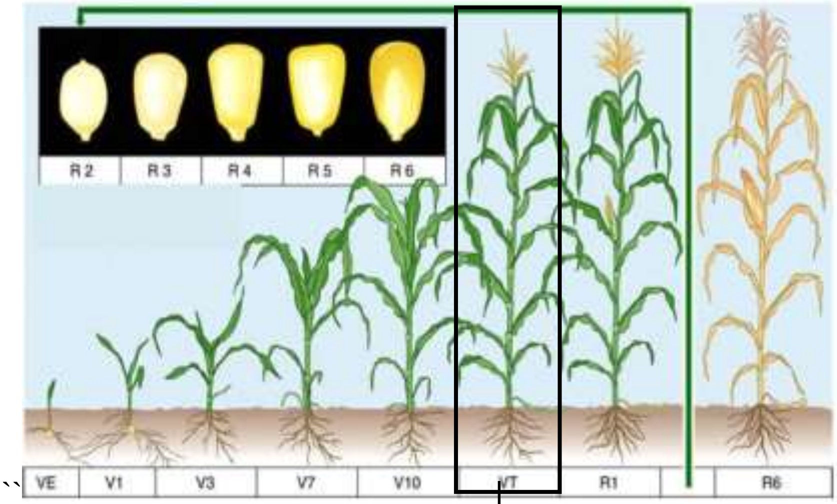
2.5. Plant Corn

Corn is an annual plant and belongs to the type of grass/graminae. Corn is plant day short, amount the leaves determined on moment initiation male flowers, and controlled by genotype, duration of irradiation, and temperature (Suarni and Widowati, 2007).

The demand for corn is good for the food, feed and industrial needs in the next five years is projected to continue to increase as with the continued increase in population. Population growth Indonesia per year as big as 1.49 percent or population projected will increase around 3.5 million people every year. Responding to the increasing demand for corn, The Directorate General of Food Crops sets corn production targets for year 2016-2019 that is increase as big as 4-5 percent/year (Directorate General of Plant Food, 2016).

Corn plants require open space and love light. Height suitable place for corn cultivation from 0 to 1300 meters above sea level. Air temperature required for plant growth corn is 23 – 27º C. pH soil which optimal for growth and development plant corn range Among 5.6 until with 6.2. plant corn does not depend on the season, but depends on the availability of sufficient water enough. If irrigation enough, planting corn on season drought will give more corn growth good (Riwandi *et al.*, 2014).

The anthesis phase is the maximum vegetative phase of corn plants. Anthesis phase/ tasseling phase / male flowering usually ranges from 45-52 days, marked by existence branch final from flower male before appearance flower female (silk/cob hair). The VT stage (Fig. 2.1) begins 2-3 days before the hair cob appear, where on period this tall plant almost reach maximum and begins to spread pollen. In this phase it is generated maximum biomass from the vegetative part of the plant, which is about 50% of the total weight plant dryness, absorption of N, P, and K by plants 60-70% each, 50%, and 80-90% (Subekti *et al* ., 2008). In bisi-18 hybrid maize (Appendix 1) age phase anthesis plant usually more from 57 day on plains low andmore from 70 days on plateau (R&D Agency Agriculture, 2013).



Information

Phase VE-V2 : Phase Germination	Phase R1 : Flowering Female	Phase R4 : Dough
Phase V3-V10 : Amount Leaf 3-10	Phase R2 : Blister	Phase R5 : Hardening Seed
Phase VT : Flowering Male	Phase R3 : Cook Milk	Phase R6 : Physiological Cook

Source: Subekti *et al.* (2008) Picture

2.1. Phase Growth Corn

Purwani *et al 's research results* . (2013) based on the characteristics of Ultisol for the growth of hybrid maize showed that the application of fertilizer 300 kg ha $^{-1}$ Urea, 250 kg ha $^{-1}$ SP-36 and 150 ha $^{-1}$ KCl yield high maize plant, stover weight and the highest cob weight. According to research results Hariyati (2017) which utilizes bagasse fly ash as a matrix of slow release fertilizer urea with corn plant indicator can increase the total N availability soil, soil available N, and reduced ammonium and nitrate leaching activity by water. Application of nitrogen slow-release fertilizer (urea fly-bagasse- molasses) plant corn up to 60 hst does not affect pH, BO, and land CEC.

CHAPTER 3
IMPLEMENTATION STUDY

3.1. Time and The place

This research held from August to December 2018 in the Greenhouse, Department of Soil, Faculty of Agriculture, Sriwijaya University. Analysis soil and plants carried out in the Laboratory of Chemistry, Biology and Soil Fertility Major Soil Faculty University Agriculture Srivijaya, Indralaya.

3.2. Tool and Material

Tool which used in study this is : 1) sieve 2 mm; 2) sieve53 m; 3) blenders; 4) hoe; 5) scissor; 6) camera; 7) pocket paper; 8) bag;
9) oven; 10) grinder; 11) ruler; 12) polybag volume 33.65 liter; 13) scales; 14) sprayer; 15) equipment for analysis in the laboratory.

Ingredient which used in study this is : 1) ash fly coal from PLTU Bukit Asam, Tanjung Enim; 2) water; 3) Bisi varietas hybrid corn seeds 18; 4) biomass azolla which obtained from pool multiplication azolla, Major Unsri FP Land; 5) dolomite lime; 6) Ultisol Indralaya; 7) Urea fertilizer; 8) fertilizer base (KCl and SP-36); 9) chemicals for analysis in the laboratory.

3.3. Method Study

Fertilizer which applied on study this is fertilizer pellet with composition (50:50) 70:30 ((50% coal fly ash and 50% azolla biomass) used as much as 70% with a mixture of urea as much as 30%) which is given the symbol PA. In addition, pellet fertilizer with a mixed composition (40:60) 70:30 . was also applied ((40% coal fly ash and 60% azolla biomass) was used as much as 70% with 30% urea mixture) which is given the symbol PB. PA and PB have 3 doses fertilization that is 50, 75 and 100% dose recommendation. Besides fertilizer pellet applied also fertilizer urea with dose recommendation 100% and frequency 1 time app that given the symbol UA. The final treatment is fertilizer application urea with a recommended dose of 100% and the frequency of application 3 times, which is 30% when planting, 35% at 15 days after planting and 35% at 30 days after planting given the symbol UB. The 100% recommended dose is 138 kg N ha $^{-1}$ referring to Purwani *et al* . (2013) based on characteristics nature Ultisol for growthhybrid corn.

Table 3.1. Dose fertilizer pellet and urea to dose reference Purwani *et al.* (2013) which used for determination N absorption at corn plant.

No	Type fertilizer	Treatment (x dose reference %)	N-total fertilizer %	Fertilizer dosagekg ha $^{-1}$	Fertilizer dosageg polybag $^{-1}$	Frequency application
1	Control	0	0	0	0	-
2	UA	100	46	300	1.50	1 kali saat tanam
3	UB	100	46	300	0,45; 0,525; 0,525	Saat tanam, 15th hst, 30 HST
4	P-A1	100	9,41	1466,54	7,33	1 kali saat tanam
5	P-A2	75	9.41	1009.89	5.49	1 time moment plant
6	P-A3	50	9.41	733.26	3.66	1 time moment plant
7	P-B1	100	8.46	1631,20	8.15	1 time moment plant
8	P-B2	75	8,46	1141,84	6,11	1 kali saat tanam
9	P-B3	50	8,46	780,14	4,07	1 kali saat tanam

The experimental design applied in this research is the Completely Randomized (CRD) with 9 treatments and 3 replications to obtain 27 polybag test. Heavy soil in every polybag is equivalent 10 kg soilabsolute dry.

3.4. Method Work

3.4.1. Making Fertilizer Pellet

Coal fly ash and azolla biomass were first air-dried, then the wind-dried product was ground and filtered through a 53 m sieve. Fertilizer Pellets are made by mixing coal fly ash, azolla biomass and urea according to treatment. Then, deionized water is added until the mixture forms pasta. Put the pasta in the grinder until the paste forms into pellets. The pellets are placed in a tray that has been lined with plastic and air-drieduntil rate less water of 3%.

3.4.2. Analysis Beginning Study

Analysis soil beginning before study refers to on research beforeHermawan *et al* . (2018) which is the soil of the Ultisol order taken from the land of arboretum, Sriwijaya University. Initial analysis of pellet fertilizer for each treatment includes: N-total and pH.

3.4.3. Preparation Media plant

Planting media preparation activities are carried out by taking soil in the field Arboretum Faculty Agriculture unsri, Indralaya. Soil which taken then air-dried and filtered through a 2.0 mm diameter sieve and weighed as much as 10 kg of absolute dry weight to be put into polybags with a diameter of 35 cm, height 35 cm and volume 33.65 liters as much as 27 polybag.

3.4.4. Giving Chalk and Fertilization

Chalk agriculture which used is dolomite. Dose dolomite which given 5.02 g $polybag^{-1}$ (Attachment 2). Chalk given with method soil removed from the polybag then lime is mixed and stirred until evenly distributed with hand. Furthermore, the land that has been removed put back to polybag and incubated for 1 week. During incubation, the soil sample was watered once every days of field capacity water content.

Basic fertilization is carried out according to recommended dosage according to Purwani *et al* ., (2013) namely KCl (60% K_2O) fertilizer with a dose of 150 kg ha^{-1} (0.75 g $polybag^{-1}$) and SP-36 fertilizer (36% P_2O_5) with a dose of 250 kg ha^{-1} (1.25 g $polybag^{-1}$) (Appendix 3). Fertilizer KCl and SP-36 were given at at planting.

Fertilizer pellet and urea applied with dose reference Purwani *et al* . (2013) 138 kg N ha^{-1} and given with method immersed in in soil with a depth of ±10 cm from the ground surface. PA, PB and UA fertilizers are given to moment plant. Whereas, UB given 3 time that is 30% moment plant, 35% on 15 day after planting and 35% on 30 days after planting.

3.4.5. planting Seed

Planting is done by inserting 3 seeds with a depth of 3 cm in part middle polybag. After plant aged 10 day, conducted selection and crop reduction by leaving 1 plant that grows the most good.

3.4.6. Maintenance

Plant maintenance is done by watering the plants twice a day, weeding to weed which grow and control pest use furadan. Maintenance conducted until phase anthesis that is phase vegetative maximum or at the time of the initial appearance of male flowers around the age of 57-70 daysafter plant.

3.4.7. Measurement Absorption N

During the anthesis phase, the plant is cut about 1 cm above the surface soil. After that, the stove is cut into small pieces and then washed with water flow for remove dust. Then dried withtissue paper and put in a paper bag and then in the oven with 70°C for 48 hours. After that it was weighed to determine the dry weight. safe dry blended and filtered with sieve 53 m. Results sieve Then the plant N content was measured by wet destruction. Plant N uptake calculated by multiplying rate N plant with plant dry weight.

Count N absorption:

$$\text{Absorption N} = \frac{\text{(rate N network plant) (\%) x (weight dry stove) (g)}}{100}$$

3.5. Variable which observed

The characteristics of the soil observed during the anthesis phase were the reaction soil (pH) and soil bases include K-dd, Na, Ca and Mg. plant variable What was observed was the number of leaves of the anthesis phase of the plant, the weight of the dry stover anthesis phase plants, N content of anthesis phase plants and N uptake in plants phase anthesis.

3.6. Analysis data

Data calculation and observation which obtained analyzed with method statistics, namely analysis of variance (F test) to determine the effect of treatment to the observed variables. If the results of the variance show an effect, then conducted test carry on orthogonal contrast level 5% and level 1% for test difference between treatment groups.

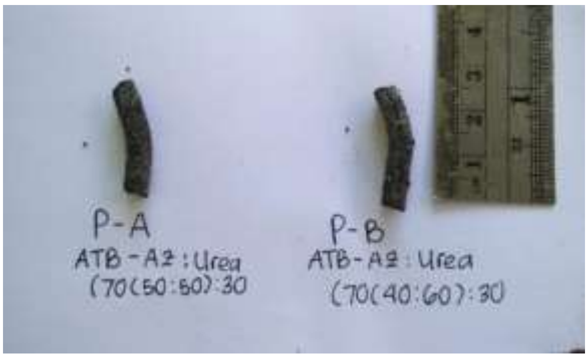
CHAPTER 4
RESULTS AND DISCUSSION

4.1 Fertilizer Characteristics Pellet

The results of the analysis of pH H_2O fertilizer pellets, the value obtained is pH H_2O fertilizer PA of 6.65 and the pH of H_2O of PB fertilizer was 6.60. This pH value is influenced by ingredient fertilizer pellet in the form of ash fly coal, azolla and urea. Study previously Hermawan *et al* . (2013) explained that coal fly ash is alkaline with a pH of 8.75. Meanwhile, the pH of azolla biomass according to Utami *et al* . (2013) has a pH of 8.06. According to Purnamasari *et al.* (2012) the pH of urea fertilizer tends to be neutral.

The results of the analysis of N-total pellet fertilizer, obtained nitrogen levels in PA . fertilizer (coal fly ash-azolla 70% (50:50) + 30% urea) and PB fertilizer (fly ash coal-azolla 70% (40:60) + urea 30%) of 9.41% and 8.46%, respectively. Based on the results of the calculation of the nitrogen content in the materials used, it is obtained that PA fertilizer has the potential to have N content of 14.486% and PB fertilizer has the potential to have N levels of 14.608% (Appendix 4). N content of pellet fertilizer in this study is lower than the potential N content of the material. This is presumably because nitrogen loss through evaporation during the fertilizer manufacturing process. According to Nainggolan *et al* . (2009) process fast urea hydrolysis very happened so that easy evaporate as ammonia.

The average weight of each pellet is 0.70 grams with a length of 3 cm and a diameter of 0.5 cm. When compared with the N content in urea fertilizer with a content of N in pellet fertilizer, the N content in 1 gram of urea is equivalent to 4.89 grams fertilizer PA and equivalent with 5.44 grams of PB fertilizer (Appendix 4).



Picture 4.1. Pellet fertilizer PA and pellet fertilizer PB

4.2. Characteristics Soil Beginning Study

The ultisol used in this study was the same soil that was used in this study used in the research of Hermawan *et al* . (2018) before. Soil analysis results beginning served on Table 4.1.

Table 4.1. Results Soil Analysis Study

Parameter	Unit	Results Analysis*)	Criteria**)
pH H2O _ _ (1:1)		4.41	Very Sour
pH KCl (1:1)		4.12	-
Rate Water	%	4.33	
C-organic	%	0.328	Very Low
N-total	%	0.034	Very Low
P-available	ppm	5.58	Very Low
K-dd	cmol $_{(+)}$ kg ^{1}	0.18	Low
Na	cmol $_{(+)}$ kg ^{1}	0.11	Low
Ca	cmol $_{(+)}$ kg ^{1}	0.25	Very Low
Mg	cmol $_{(+)}$ kg ^{1}	0.03	Very Low
Kindergarten	cmol$_{(+)}$kg^{-1}	10,88	Rendah
Al-dd	cmol$_{(+)}$kg^{-1}	1,04	-
H-dd	cmol$_{(+)}$kg^{-1}	0,12	-

Keterangan:
*) :Result analysis in Laboratory Chemical, Biology and Fertility Major Land Soil Faculty Agriculture University Srivijaya, (2017)
**) : Criteria based on Soil Research Center (1995)
Source : Hermawan *et al* . (2018)

Based on the criteria of the Soil Research Center (1995) the soil in this study including infertile soil. Low soil fertility is characterized by very acidic soil reaction (pH H_2O 4.41). According to Budianta and Ristiani (2013) low pH soil cause element hara macro N, P and K difficult available for plant growth.

Content C-organic belong to very low (0.328%), N-total soil classified as very low (0.034%), the level of available P is classified as very low (5.58 ppm), capacity swap cation belong to low (10.88 cmol $_{(+)}$ kg $^{-1}$), cationslanguage which belong to very low like Ca (0.25 cmol $_{(+}$ kg $^{-1}$) and Mg (0.03cmol $_{(+)}$ kg $^{-1}$) and K-dd (0.18 cmol $_{(+)}$ kg $^{-1}$) and Na (0.11 cmol $_{(+)}$ kg $^{-1}$) which are classified as low. According to Prasetyo and Suriadikarta (2006) state that Ultisol characterized by acid soil reactions, low base saturation and cations which can be exchanged such as Ca, Mg, Na and K are low and poor in content ingredient organic.

4.3. Amount Leaf

Based on the results of the analysis of variance at the 5% level, it shows that the treatment take effect real to amount leaf plant corn on phase anthesis (Appendix 5). This is presumably due to the ability of fertilizers to supply N . elements different in each treatment. According to Zuraida (2014), *slow* chemical fertilizers *release* release hara more slow so that lost element hara consequence washing by more water small.

Based on the results of the orthogonal contrast test, it is shown that only the comparisonControl vs. N Fertilizer and different Comparison of Pellet Fertilizer Vs Urea Fertilizer very significant at the 1% level. The results of the orthogonal contrast of the number of leaves can be seen on Table 4.2.

Table 4.2. Results orthogonal test contrast amount leaf plant corn phase anthesis

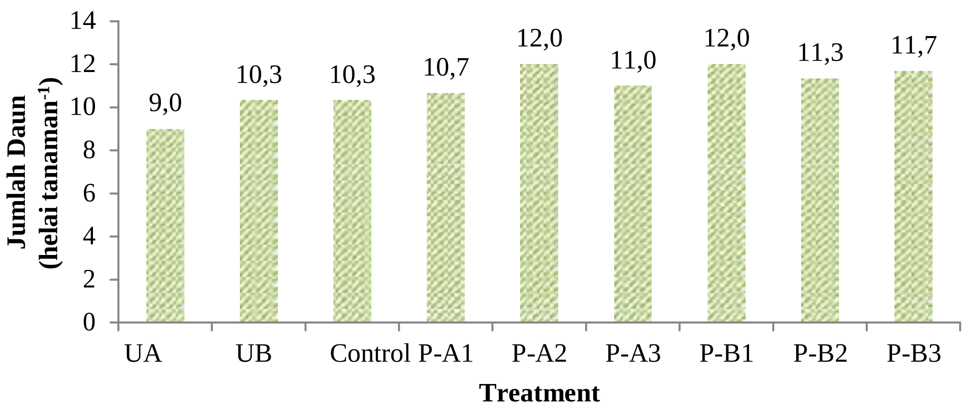
Treatment	Average Number of Leaves(sheet plant $^{-1}$)			F-Count	F-Table	
					5%	1%
Control (K) vs Fertilizer N	9.00	vs	11.17	13.00 **	4.41	8.29
Pellet Fertilizer vs Urea	11.44	vs	10.33	5.77 *	4.41	8.29
Urea-A vs Urea-B	10,33	Vs	10,33	0,00 tn	4,41	8,29
P-A vs P-B	11,22	Vs	11,67	0,92 tn	4,41	8,29
P-A1 vs P-A2,P-A3	10,67	Vs	11,50	1,44 tn	4,41	8,29
P-A2 vs P-A3	12,00	Vs	11,00	1,56 tn	4,41	8,29
P-B1 vs P-B2,P-B3	12,00	Vs	11,50	0,52 tn	4,41	8,29
P-B2 vs P-B3	11,33	Vs	11,67	0,17 tn	4,41	8,29

Information : ** = different very real, * = different real, tn=different no real.

The results of the orthogonal contrast test Table 4.2 shows that the comparison group Control vs. Fertilizer N was significantly different to the number of plant leaves. This is becauseN fertilizer can increase the levels of nutrients available in the soil. Rate These available nutrients can stimulate hormonal activity in the formation of leaf. Novizan (2005) state amount leaf influenced by element hara N, P and existing K in the soil.

The results of the orthogonal contrast test in Table 4.2 also show that the number of Leaf pellet fertilizer was significantly higher than urea fertilizer. This is because Pellet fertilizer can release the nutrients it contains little by little according towith needs plant so that element hara nitrogen which play a role in leaf growth is not easily lost. According to Agsya (2018), *urea slow release* could optimizing absorption nitrogen by plant so that could increase amount leaf plant. Thing this also related with availability element hara nitrogen which contained in fertilizer *slow release urea* which play a role as composer protein for spur division cells meristem and increase plant vegetative growth.

Based on the average result the lowest number of leaves was found in the Control treatment. While the highest number of leaves was found in the treatment of P-A2 and P-B1. The result of the average number of leaves of the corn plant of the anthesis phase (plant strands $^{-1}$) on each treatment presented on Picture 4.2.



Note: PA & PB : ATB-AZ:Urea [Dose]. UA & UB : [Dose] (Frequency Application)

Control : Without N . fertilizer	P-A1 : 70(50:50):30 [100%]	P-B1 : 70(40:60):30 [100%]
U-A : Urea [100%] (1x)	P-A2 : 70(50:50):30 [75%]	P-B2 : 70(40:60):30 [75%]
U-B : Urea [100%] (3x)	P-A3 : 70(50:50):30 [50%]	P-B3 : 70(40:60):30 [50%]

Picture 4.2. Average amount leaf plant corn phase anthesis on eacheach treatment.

Based on Figure 4.2 the control treatment had the lowest number of leaves that is 9 sheet plant $^{-1}$. Thing this due to availability element hara to treatment Control very not enough. According to Hanafiah (2005) availability element hara which not enough from amount which needed plant, will cause growthleaf hampered.

Based on Picture 4.2 treatment P-A2 composition ash fly coal- azolla 70% (50:50) + urea 30% with a recommended dose of 75% and P-B1 composition coal fly ash-azolla 70% (40:60) + 30% urea with recommended dosage 100% indicates the highest mean of the number of plant leaves, which is 12 leaves plant $^{-1}$. However, based on the orthogonal contrast test (Table 4.2) the P-group treatment A vs PB and P-B1 Vs P-B2 and P-B3 treatments were not significantly different against number of leaves. In other words, the use of P-B3 pellet fertilizer at a dose of 50% of the recommended The field produced the number of leaves which tended to be the same as P-B1 at a dose of 100%. field recommendations so as to save 50% of the use of pellet fertilizer. This matter caused because fertilizer pellet release hara by slow in accordance needs plant. The application of a higher dosage of pellet fertilizer is thought to not cause concentration N in soil Becomes tall. Will but could cause a decrease in the efficiency of N uptake because it is not utilized optimally (Siregar and Marzuki, 2011).

4.4. Heavy safe Dry

Based on the results of the analysis of variance at the 1% level, it shows that the treatment very significant effect on the weight of dry stover (Appendix 7). This matter because amount leaf take effect to heavy safe dry. According to Goldsworthy and Fisher (1992) leaf is source assimilate main for increase heavy safe dry. Besides that, suspected also because treatment using different types and doses of fertilizers so that the availability of N in the soil is also different (Appendix 18). This is in accordance with the opinion of Gozali and Yakup (2011) states that the availability of nutrients plays an important role as a source energy so that level adequacy hara play a role in influence biomass of a plant. The results of the dry stover weight contrast orthogonal test could viewed on Table 4.3.

Table 4.3. Results test orthogonal contrast heavy safe dry plant corn phaseanthesis

Treatment	Average Weight of the SafeDry (g plant $^{-1}$)			F-Count	F-Table	
					5%	1%
Control (K) vs Fertilizer N	6.33	vs	21.27	14.72 **	4.41	8.29
Pellet Fertilizer vs Urea	24.65	vs	11.16	20.23 **	4.41	8.29
Urea-A vs Urea-B	9.68	vs	12.64	0.32 ^{mr}	4.41	8.29
P-A vs P-B	25,42	Vs	23,87	0,27 ^{tn}	4,41	8,29
P-A1 vs P-A2,P-A3	25,80	Vs	25,23	0,02 ^{tn}	4,41	8,29
P-A2 vs P-A3	26,92	Vs	23,54	0,42 ^{tn}	4,41	8,29
P-B1 vs P-B2,P-B3	28,47	Vs	21,57	2,36 ^{tn}	4,41	8,29
P-B2 vs P-B3	20,94	Vs	22,20	0,06 ^{tn}	4,41	8,29

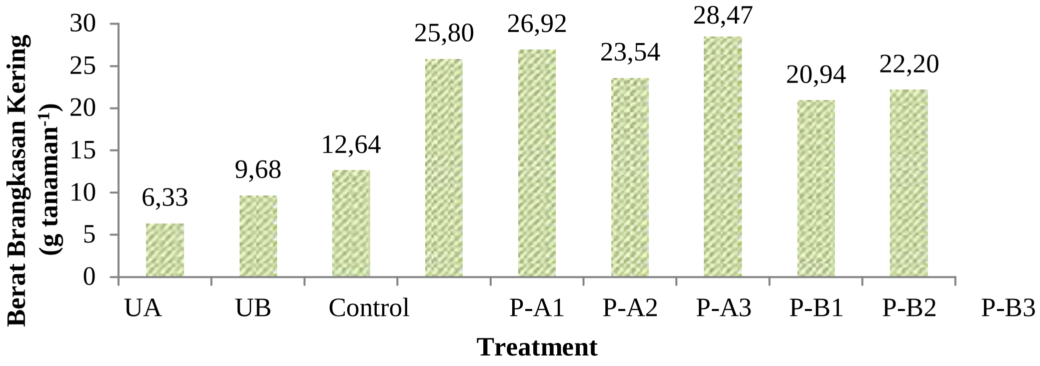
Information : ** = different very real, tn= different no real.

Based on the results of the orthogonal contrast test in Table 4.3 shows that treatment fertilizer N different very real more tall compared with control treatment on dry weight of the fry. Control mean is very low ie 6.33 g plants $^{-1}$ while the average N fertilizer was 21.27 g plants $^{-1}$. Test results orthogonal contrast also shows the weight of dry stover in pellet fertilizer treatment significantly higher than the urea fertilizer treatment. Treatment mean pellet fertilizer higher that is 24.65 g plants $^{-1}$ compared to urea fertilizer which has an average 11.16 g plant $^{-1}$. Results test orthogonal contrast heavy safe dry show no existence difference which real on comparison Urea-A and Urea-B. The comparison between PA and PB also showed no significant difference. Treatment P-A1 was not significantly different from the treatment P-A2 and P-A3, as well as P-A2 and P-A3 show different no real. Treatment P-B1 show differentnot significant to the P-B2 and P-B3 treatments. The treatment of P-B2 is also different isn't it real compared with treatment P-B3 to variable heavy safe dry corn plant phase anthesis.

Based on the results of the orthogonal contrast test at the level of 1% N fertilizer is very different real more tall compared with treatment control to heavy dry brisket. This is because the control treatment did not get additional nutrients, especially N nutrients so that the division and enlargement of cells plant cells will be inhibited. Low nutrient elements mean low too rate photosynthesis and low also content protein so that development plants are stunted. As Sari (2019) stated, availability Nutrients greatly affect plant growth and development, especially element N. Low N availability results in stunted growth and plant development.

The increase in plant dry weight is influenced by the ability of the soil to supplying element N to area rhizosphere for absorbed by plant. Increase ability soil in supplying N there is relation with ability fertilizer which given in provide N for plant. Based on the orthogonal contrast test, the 1% level of pellet fertilizer was significantly different from fertilizer urea on plant dry weight. This is because the pellet fertilizer treatment has coating material for coal fly ash and azolla biomass which can slow down release of nitrogen from urea so that pellet fertilizer can increase the availability element N in the soil compared to urea fertilizer. Wahyudi (2009) stated that when the availability of macro nutrients increases, the amount that can be absorbed by plant also will increase, accompanied with formation compounds organic matter in plant tissues. Coal fly ash also plays a role in donating nutrients such as CaO (4.53%), and MgO (2.22%), which can cause an increase in solid material in the body of corn plants, up toon finally also can improve heavy dry safe corn plant.

The average yield of dry stover weight of corn plants in anthesis phase (g plant $^{-1}$)on each treatment is presented in Fig 4.3.



Note: PA & PB : ATB-AZ:Urea [Dose]. UA & UB : [Dose] (Frequency Application)

Control : Without N . fertilizer	P-A1 : 70(50:50):30 [100%]	P-B1 : 70(40:60):30 [100%]
U-A : Urea [100%] (1x)	P-A2 : 70(50:50):30 [75%]	P-B2 : 70(40:60):30 [75%]
U-B : Urea [100%] (3x)	P-A3 : 70(50:50):30 [50%]	P-B3 : 70(40:60):30 [50%]

Picture 4.3. Average heavy safe dry plant corn phase anthesis oneach treatment.

Based on the results of the average weight of dry stover, it shows that the weight The highest dry stover was found in the P-B1 treatment, namely pellet fertilizer treatment mixture ash fly coal-azolla 70% (40:60) + urea 30% with dose recommendation 75% with heavy safe dry as big as 28.47 g plant $^{-1}$. While the lowest dry weight of the stove was found in the control treatment, namely without N . fertilizer treatment of 6.33 g plant $^{-1}$.

Based on Figure 4.3 the control treatment has a dry weight of stover Lowest. This is because the nutrients, especially nitrogen in the control treatment, are very high not enough . According to Hanafiah (2005) the availability of nutrients that are less than the amount which needed plant, will cause growth and development plant hampered.

P-B1 treatment showed the highest dry stover weight of 28.47 g plant $^{-1}$. However, based on the orthogonal contrast test the P-B1 Vs P-B2 . group treatment and P-B3 were not significantly different on the dry weight of the stover. In other words use of pellet fertilizer PB dose of 50% of the field recommendation can get heavy safe dry which same with PB dose 100% suggestion field so it can save 50% PB fertilizer use. The same goes for PA group treatment. Based on the results of the orthogonal contrast treatment of the PA Vs . group PB, as well as the treatment groups P-A1 Vs P-A2 and P-A3 were not significantly different against dry weight of the stove so that the use of P-A3 pellet fertilizer (dose of 50% of recommendations from the field) can obtain the same dry weight as P- A1 (dose 100% recommendation field) so that could save use fertilizer P-

A by 50%. This suggests that even at higher doses, fertilizer pellet permanent could release element hara by slow in accordance with plant needs, so it is suspected that it will not result in high N concentrations in the in the ground. This is in accordance with the opinion of Trenkel (2010) that *slow fertilizer release* is able to increase nutrients in the soil effectively and efficiently or notcause overdose.

4.5. Rate N Plants

Based on the results of the analysis of variance at the 5% level, it shows that the treatment significant effect on the N content of corn plants in the anthesis phase (Appendix 9). This is because nitrogen fertilization can increase the N content of corn plants. Results grade orthogonal test N plants could viewed on Table 4.4.

Table 4.4. Test results orthogonal contrast N . level corn plant phase anthesis

Treatment	Plant N Content(g 100g $^{-1}$)			F-Count	F-Table	
					5%	1%
Control (K) vs Fertilizer N	2.13	vs	2.52	7.80 *	4.41	8.29
Pellet Fertilizer vs Urea	2.59	vs	2.30	7.61 *	4.41	8.29
Urea-A vs Urea-B	2.33	vs	2.27	0.11 tn	4.41	8.29
PA vs PB	2.54	vs	2.64	0.76 tn	4.41	8.29
P-A1 vs P-A2,P-A3	2,88	Vs	2,38	9,72**	4,41	8,29
P-A2 vs P-A3	2,33	Vs	2,43	0,31tn	4,41	8,29
P-B1 vs P-B2,P-B3	2,83	Vs	2,54	3,26tn	4,41	8,29
P-B2 vs P-B3	2.56	vs	2.52	0.04 tn	4.41	8.29

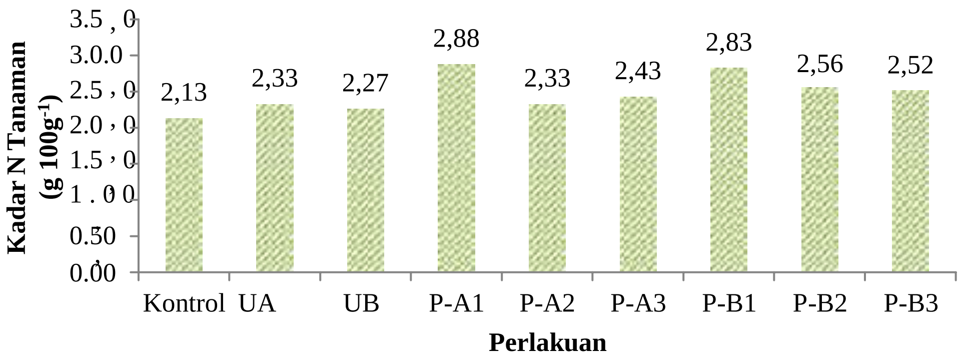
Information : ** = different very real, * = different real, tn=different no real.

Results test orthogonal contrast influence treatment to rate N plant onTable 4.4 show that rate N plant on treatment fertilizer N differentreal more tall compared treatment control. Average control that is 2.13g 100g $^{-1}$whereas, Fertilizer average N that is 2.52 g 100g $^{-1}$. Table 4.4 also show N . levelplant treatment fertilizer pellet different real more tall from treatment fertilizerurea. Average treatment fertilizer pellet more tall that is 2.59 g 100g $^{-1}$ comparedfertilizer urea which have average 2.30 g 100g $^{-1}$. Rate N plant treatment P-A1show different real more tall compared treatment P-A2 and P-A3.Average P-A1 . treatment that is 2.88 g 100g $^{-1}$ whereas P-A2 and P-A3 haveaverage 2.38 g 100g $^{-1}$. Results test orthogonal contrast comparison group othershowed that there was no significant difference to the variable of plant N content.Results test orthogonal contrast comparison Control vs Fertilizer N on Table 4.4 show that gift fertilizer N capable increase rate N plant corn. This matter because application of N fertilizer can increase the availability of N soil so that it is used to form plant tissue. According to Novizan (2005) nitrogen compounds are used by plants to form amino acids that will changed to protein, chlorophyll, nucleic acids and enzymes.

The results of the orthogonal contrast test in Table 4.4 show that the comparison pellet fertilizer vs urea was significantly different to the N content of corn plants in the anthesis phase. This is because pellet fertilizer contains organic matter that can optimize plant growth. According to Nuryanti *et al* . (2010) organic matter can be source of essential nutrient supply (nitrogen) for plants and can also increase productivity soil.

Rate N plants corn phase anthesis on comparison P-A1 real more high compared to P-A2 and P-A3 can be seen in Table 4.4. This matter presumably because more high dose of fertilizer pellet material organic conceived fertilizer is also higher so that the plant N content is also high due to the presence of root improvement from the addition of organic matter. According to Hamihenda (2006) The composition of nutrients in plants is influenced by plant age, climate, soil properties, factor management like fertilization, material giving ameliorant and etc.

The average yield of N levels in the anthesis phase of maize (g plants $^{-1}$) in each treatment is presented in Figure 4.4. Based on the results of the average plant N content showed that the lowest N levels were in the control treatment with levels of 2.13 g 100g $^{-1}$. Meanwhile, the highest plant N levels were found in the P-A1 . treatment with content of 2.88 g plant $^{-1}$.



Note: PA & PB : ATB-AZ:Urea [Dose]. UA & UB : [Dose] (Frequency Application)

Control : Without N . fertilizer	P-A1 : 70(50:50):30 [100%]	P-B1 : 70(40:60):30 [100%]
U-A : Urea [100%] (1x)	P-A2 : 70(50:50):30 [75%]	P-B2 : 70(40:60):30 [75%]
U-B : Urea [100%] (3x)	P-A3 : 70 (50:50): 30 [50%]	P-B3 : 70 (40:60): 30 [50%]

Picture 4.4. Rerata up to N plants corn phase anthesis on respectively treatment.

Based on Figure 4.4, it is known that there is a tendency for higher doses of PB fertilizer the higher the N content of the plant. In addition, in Table 3.4 known also that comparison P-A1 vs P-A2 and P-A3 show different realto variable rate N plant. However, on fertilizer treatment P-A2 (ash fly coal-azolla 70% (50:50) + urea 30% dose 75%) plant N content is more lower than the P-A3 treatment (coal fly ash-azolla 70% (50:50) + urea 30% dose 50%). This suspected because a number of factor which influence The availability of nutrients in the soil to be absorbed by plants, among others, is total nutrient supply, soil moisture, aeration, soil temperature, and physical and chemical properties soil (Gozali and Yakup, 2011).

4.6. Absorption N Plant

Results analysis variety on level 1 % show that treatment take effect very real to score absorption N plant (Attachment 11). Thisbecause fertilization can increase plant N uptake. Nitrogen uptake Plants is the amount of nitrogen nutrients that enter the plant tissue obtained based on the results of plant tissue analysis (Turner and Hummel, 1992). The results of the orthogonal N uptake contrast test of corn plants in the anthesis phase can be seen on Table 4.5.

Table 4.5. Results test orthogonal contrast N . absorption corn plant phase anthesis

Treatment	Plant N Absorption ($g\ plant^{-1}$)			F-Count	F-Table	
					5%	1%
Control (K) vs Fertilizer N	0.13	vs	0,54	18,37 **	4,41	8,29
Pupuk Pelet vs Urea	0,64	Vs	0,25	27,96 **	4,41	8,29
Urea-A vs Urea-B	0,23	Vs	0,28	0,14 tn	4,41	8,29
P-A vs P-B	0,64	Vs	0,64	0,00 tn	4,41	8,29
P-A1 vs P-A2,P-A3	0,74	Vs	0,59	1,81 tn	4,41	8,29
P-A2 vs P-A3	0,61	Vs	0,57	0,11 tn	4,41	8,29
P-B1 vs P-B2,P-B3	0,81	Vs	0.56	5.24 *	4.41	8.29
P-B2 vs P-B3	0.55	vs	0.56	0.02 mr	4.41	8.29

Information : ** = different very real, * = different real, tn=different no real.

Based on the results of the orthogonal contrast test in Table 4.5 shows that control different very real compared fertilizer N to absorption plantcorn. The control mean is very low, namely 0.13 g of plants $^{-1}$ while the average fertilizerN is 0.54 g plant $^{-1}$. Table 4.5 also shows the N uptake of treatment plantspellet fertilizer was significantly higher than the urea fertilizer treatment. Treatment mean fertilizer pellet more tall that is 0.64 g plant $^{-1}$ compared fertilizer urea which has an average of 0.25 g of plants $^{-1}$. The N uptake of P-B1 treatment plants was significantly different higher than the P-B2 and P-B3 treatments. Treatment mean P-B1 that is 0.81 g plants $^{-1}$ while P-B2 and P-B3 had an average of 0.56 g plants $^{-1}$. Results orthogonal test of plant N uptake showed no significant difference significantly in the comparison of Urea-A and Urea-B. Comparison between PA and PB too shows the difference is not real. The treatment of P-A1 was not significantly different to P-A2 and P-A3 treatments, as well as P-A2 and P-A3 showed no difference real. P-B2's treatment is different not real to P-B3 treatment.

Orthogonal contrast test results for Control vs. N fertilizer in Table 4.5 showed that the application of N fertilizer was able to increase plant N uptake corn. This matter because application of N fertilizer can increase the availability of N soil and increase weight dry plant which will influence score absorption N plant. Thing this in accordance with opinion Wahyuni (2009), which state that enhancement absorption N plant there is the relationship with enhancement weight dry plant, repair development root plant, andenhancement availability N ground.

Comparison of Pellet Fertilizer is significantly higher than the group Urea fertilizer on N uptake of corn plants in anthesis phase. This is because of fertilizer pellet contain ingredient organic which could optimizing growth plants because they have complete and persistent nutrients in the soil. In addition, pellet fertilizer can make fertilization more efficient where pellet fertilizer can be used retain nutrients so that they are available to plants. According to Hara (2011) pellet fertilizer could tie hara and could released on moment plant need so that plants are protected from poisoning hara and nutrient deficiency.

Orthogonal contrast of N uptake of corn plants in anthesis phase in comparison Urea-A and Urea-B different no real could seen on Table 4.5. Thing this due to the physical properties of Ultisol which makes it difficult for the roots of corn plants to penetrate soil to absorb nutrients. Prasetyo and Suriadikarta (2006) stated Ultisols have a medium to strong structure, with angular lumps and has a low infiltration capacity.

Based on Table 4.5 is known that comparison PA and PB no showed significant differences in plant N uptake. According to Saputra (2018) release of nitrate by combination briquette fertilizer 70% (ATB-AZ 50%: 50%): 30 urea and combination briquette fertilizer 70% (ATB-AZ 40% : 60%) : 30 average per week release nitrate consecutive 0.972 ppm and 0.936 ppm. This showed that the release of nitrate from the two fertilizers tended to be the same so that The N uptake of the two fertilizer comparison plants also showed no difference which real.

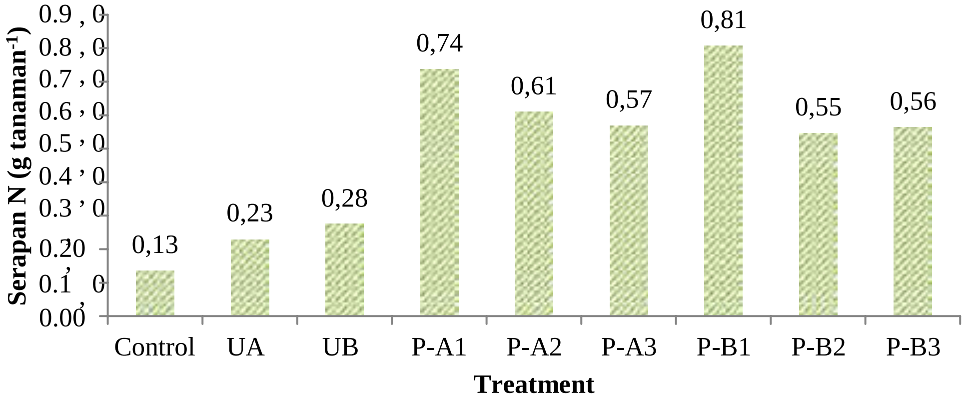
Orthogonal test of plant N uptake contrast in comparison P-A1 Vs P-A2 and P-A3 and the comparison P-A2 and P-A3 showed no significant difference. However there is a tendency, the higher the PA dose, the higher the N . uptake rate plant. Wahyudi (2009) state that when hara macro in soil increases, the amount that can be absorbed by plants will also increase. accompanied with formation compounds deep organic plant tissue.

Plant N uptake in comparison P-B1 was significantly higher than P-B1 B2 and P-B3 (Table 4.5). Treatment mean P-B1 is 0.81 g plants $^{-1}$ higher compared to P-B2 and P-B3 which had an average of 0.56 g of plants $^{-1}$. It is suspected because the pH of the P-B1 treatment was higher than that of the P-B2 and P- B3. According to Wahyudi (2009), the increase in plant N uptake is related with the increase in plant development which is related to the improvement of condition land (increase soil pH).

Based on Table 4.5 show that comparison P-B2 and P-B3 not significantly different on plant N uptake. Average absorption of N treatment P-B2 is 0.55 g plants $^{-1}$ lower than the N uptake of P-B3 treatment with levels of 0.56 g plant $^{-1}$. This is presumably because the pH of the P-B2 treatment was lower than treatment P-B3 so absorption N on treatment P-B2 tend more low.

The results of the average N uptake of corn plants in the anthesis phase (g plants $^{-1}$) in each treatment is presented in Figure 4.5. Based on the results of the average plant N uptake show that absorption N Lowest there is on treatment UA (no including control) with a concentration of 0.23 g plants $^{-1}$. Meanwhile, plant N uptake highest found in P-B1 treatment with a concentration of 0.81 g plant $^{-1}$.

The lowest N uptake in UA treatment (excluding control) because UA is treatment urea with frequency application 1 time when planting so that urea on treatment UA easy is lost and no could absorbed plant. According to Zuraida (2014), absorption N urea low because urea hydrolyzed fast which catalyzed by urease so that easy carried away water (*leaching*). More carry on Novizan (2005) explained, some nitrogen is absorbed in the form of NO_3^-, however NO_3^- easier to wash off by water. The washing direction is towards the layer below the area root so that no can be used by plant.



Note: PA & PB : ATB-AZ:Urea [Dose]. UA & UB : [Dose] (Frequency Application)

Control : Without N . fertilizer	P-A1 : 70(50:50):30 [100%]	P-B1 : 70(40:60):30 [100%]
U-A : Urea [100%] (1x)	P-A2 : 70(50:50):30 [75%]	P-B2 : 70(40:60):30 [75%]
U-B : Urea [100%] (3x)	P-A3 : 70(50:50):30 [50%]	P-B3 : 70(40:60):30 [50%]

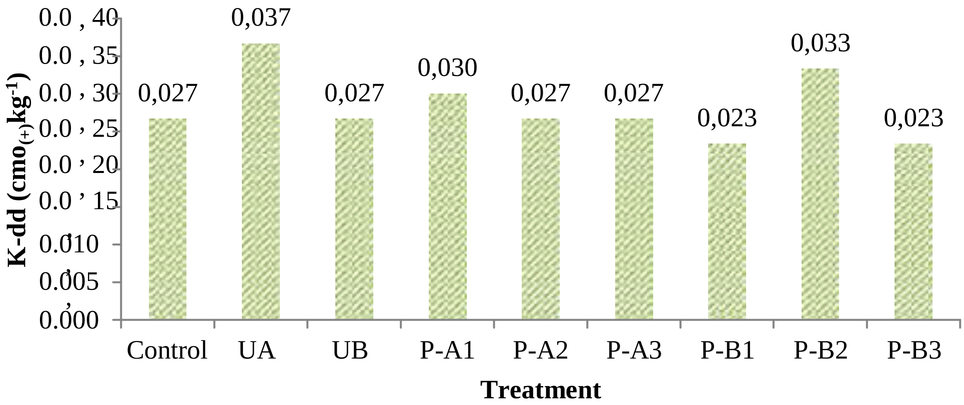
Picture 4.5. Average absorption N plant corn phase anthesis on eachtreatment.

Based on Picture 4.5 show that absorption N plant highestin the P-B1 treatment with a composition of 70% coal fly ash-azolla mixture (40:60) + 30% urea with a recommended dose of 100%, namely with an absorption rate of N as big as 0.81 g plant $^{-1}$. Based on test orthogonal contrast on Table 4.5 comparison of treatment P-B1 vs P-B2 and P-B3 significantly different on N . uptake corn plant. With other word this show treatment P-B1 is the best treatment of plant N uptake parameters. Plant nitrogen uptake which is high because the P-B1 treatment has organic azolla which more many and have heavy safe dry highest compared with treatment which other. Ingredient organic cause existence improvement of plant roots, so that the supply of nutrients can be readily available fast for plants, especially the element N because nitrogen is the main constituent heavy dry plants (Nuryanti *et al* ., 2010).

4.7. K-dd Tanah

Results analysis diversity on level 5 % show that treatment no significant effect on soil K-dd levels (Appendix 13). This is because urea fertilizer does not contain potassium, while ash-based fertilizers fly coal, azolla and urea only contain element hara potassium which low. According to Anggono (2018), fertilizer (ATB:AZ):Urea 70(50:50): 30 and 70(40:60): 30 has a K-Total content of 1.75%. In addition, according to Subandi (2013), number of K can exchange only 1-2% of K-Total in soil.

Results average measurement K-dd soil (cmol $_{(+)}$ kg $^{-1}$) moment plant corn phase anthesis show that rate K-dd on study this belong to very low, which is in the range of 0.023-0.037 cmol $_{(+)}$ kg $^{-1}$. K-dd average result (cmol $_{(+)}$ kg $^{-1}$) on each treatment is presented in Figure 4.6.



Note: PA & PB : ATB-AZ:Urea [Dose]. UA & UB : [Dose] (Frequency Application)

Control : Without N . fertilizer	P-A1 : 70(50:50):30 [100%]	P-B1 : 70(40:60):30 [100%]
U-A : Urea [100%] (1x)	P-A2 : 70(50:50):30 [75%]	P-B2 : 70(40:60):30 [75%]
U-B : Urea [100%] (3x)	P-A3 : 70(50:50):30 [50%]	P-B3 : 70(40:60):30 [50%]

Figure 4.6 shows that the average K-dd value of the soil is between 0.023 – 0.037 cmol $_{(+)}$ kg $^{-1}$. According to the criteria of the Soil Research Center (1995), the current K-dd condition of the soil the anthesis phase of corn plants including very low criteria. This is presumably because mostly potassium has been used by plants so that the K-dd value of the soil be very low. In line with Subandi's research (2013) that K in solution land is decreasing due to absorbed by plants.

Control treatments, P-A2 and P-A3 had relatively the same K-dd levels, namely 0.027 cmol $_{(+)}$ kg $^{-1}$. This is thought to be influenced by calcium levels in the treatment also have values that tend to be the same. According to Putra (2018) the presence of Ca^{2+} affect K uptake, K uptake by plant roots plays an important role in control the balance of exchange and availability of K.

The lowest soil K-dd levels were found in the P-B1 and P-B3 treatments, namely 0.023 cmol $_{(+)}$ kg $^{-1}$. The low K-dd is thought to be influenced by the addition of biomass azolla which tall (42% from whole) so that increase absorption

K in plants. According to Nuryanti *et al* . (2010) organic matter can improve environment grow plant including structure soil, repair fertility soil, and increase the efficiency of nutrient uptake. Meanwhile, K-dd treatment P-B2 which is higher than the P-B1 and P-B3 treatments is thought to be influenced by the absorption of N at low P-B2 treatment. Roskarman and Yuwono (2002) stated cation K could obstruct fixation NH_4^+ _ and NH_4^+ _ also capable obstruct K fixation.

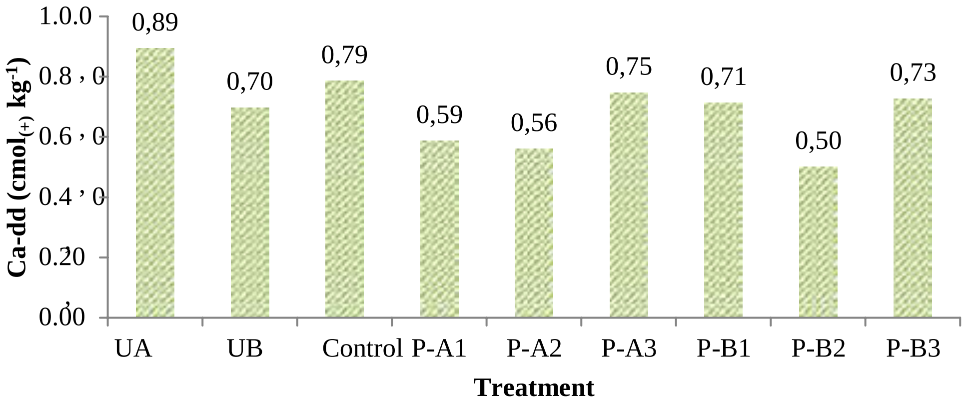
Urea-A treatment had the highest soil K-dd content compared to treatment other. Thing this suspected because treatment Urea-A conducted with administration of urea as much 1 time moment season plant cause nutrient N easily lost and plant growth to be disturbed. Plant growth which disturbed cause absorption element hara other also no optimal. According to Hanafiah (2005), in general, nutrient requirements (from minimum to maximum) based on weight dry is as following : Mo<Cu<Zn=Mn<B
<Fe=Cl<S<P-Mg<Ca<K<N.

4.8. Ca-dd Tanah

According to Roskarman and Yuwono (2002) , calcium is one of the most important nutrients essential, element this absorbed in form Ca^{2+} . Calcium working as stimulant development root and leaf, help reduce NO_3^- in plants, helps neutralize organic acids in plants and needed in bulk by binding bacteria N-atmosphere.

The results of the analysis of variance showed that the treatment had no significant effect to Ca-dd soil (Attachment 14). This suspected because treatment fertilizer pellet contains Ca-dd from coal fly ash which is low so that the statistical difference in treatment was not significant. According to Hermawan *et al* . (2013) content Ca-dd in gray fly coal of 4.80 cmol$_{(+)}$ kg^{-1} .

Results average Ca-dd (cmol$_{(+)}$ kg^{-1}) moment plant corn phase anthesis on every treatment is presented in Figure 4.7. According to Soil Research Center criteria (1995) the mean Ca-dd results in each treatment are classified as very low criteria (Appendix 19) with a Ca-dd of 0.50 - 0.89 cmol$_{(+)}$ kg^{-1} . This is presumably because The pH in each treatment was classified as acidic. According to Putra (2018) Low Ca related with pH.



Note: PA & PB : ATB-AZ:Urea [Dose]. UA & UB : [Dose] (Frequency Application)

Kontrol : Tanpa Pupuk N	P-A1 : 70(50:50):30 [100%]	P-B1 : 70(40:60):30 [100%]
UA : Urea [100%] (1x)	P-A2 : 70(50:50):30 [75%]	P-B2 : 70 (40:60): 30 [75%]
UB : Urea [100%] (3x)	P-A3 : 70 (50:50): 30 [50%]	P-B3 : 70 (40:60): 30 [50%]

Gambar 4.7. Rerata Ca-dd tanah saat tanaman jagung fase anthesis

Based on Figure 4.7, it is known that the highest Ca-dd levels were in the treatment The control is 0.89 cmol $_{(+)}$ kg $^{-1}$. While the lowest level of Ca-dd is at treatment PB-2 that is treatment fertilizer pellet composition mixture ash fly coal-azolla 70% (40:60) + 30% urea with dose recommendation 75% that is as big as 0.50 cmol $_{(+)}$ kg $^{-1}$.

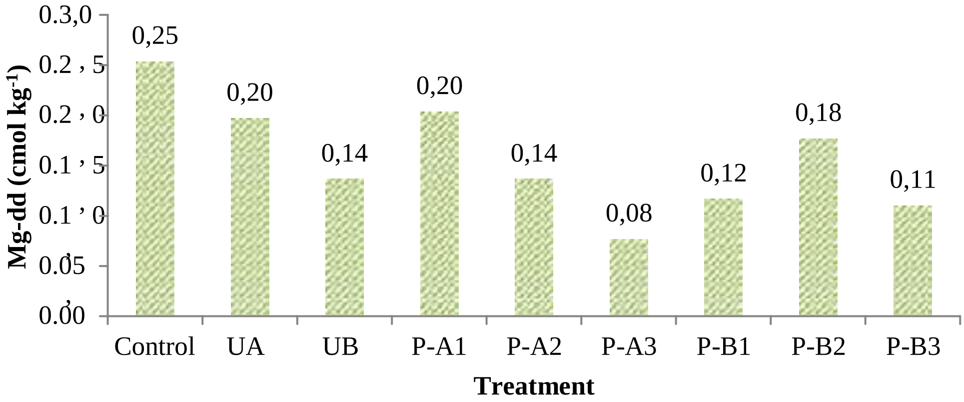
Rate Ca-dd on Control tend more tall compared with other treatments. This is presumably because the Control treatment lacks N . nutrients thereby hindering plant growth. Ca available in the soil not optimally utilized by plants. According to Liebig's Law of Minimums which states that plant development is limited by limiting factors single, only after factor barrier single this fulfilled until to level sufficient, the increase in other marginal growth factors will only get response.

Rate Ca-dd soil on treatment P-B2 have score Lowest. According to Soemarno (2010), factors which influence Ca-dd is 1) amount exchangeable calcium, 2) degree of saturation of the elements in the complex exchange, 3) type colloid land and 4) nature complementary ions which in clay giraffe.

4.9. Mg-dd Tanah

Results analysis variety on level 5 % show that treatment no significant effect on soil Mg-dd levels (Appendix 15). Pellet fertilizer contain magnesium from mixture ingredient ash fly coal. According to analysis in the research of Hermawan *et al* . (2012) Mg-dd content in fly ashcoal that is 21 cmol $_{(+)}$ kg $^{-1}$.

Results average Mg-dd (cmol $_{(+)}$ kg $^{-1}$) soil moment plant corn phase anthesis on every treatment served in Picture 4.8. Based on results average Mg-dd (cmol $_{(+)}$ kg $^{-1}$) soil show that condition magnesium which could exchanged for each treatment classified as very low criteria with an average average of 0.08-0.25 cmol $_{(+)}$ kg $^{-1}$.



Note: PA & PB : ATB-AZ:Urea [Dose]. UA & UB : [Dose] (Frequency Application)

Control : Without N . fertilizer	P-A1 : 70(50:50):30 [100%]	P-B1 : 70(40:60):30 [100%]
U-A : Urea [100%] (1x)	P-A2 : 70(50:50):30 [75%]	P-B2 : 70(40:60):30 [75%]
U-B : Urea [100%] (3x)	P-A3 : 70(50:50):30 [50%]	P-B3 : 70(40:60):30 [50%]

Picture 4.8. Average Mg-dd soil plant time phase corn anthesis

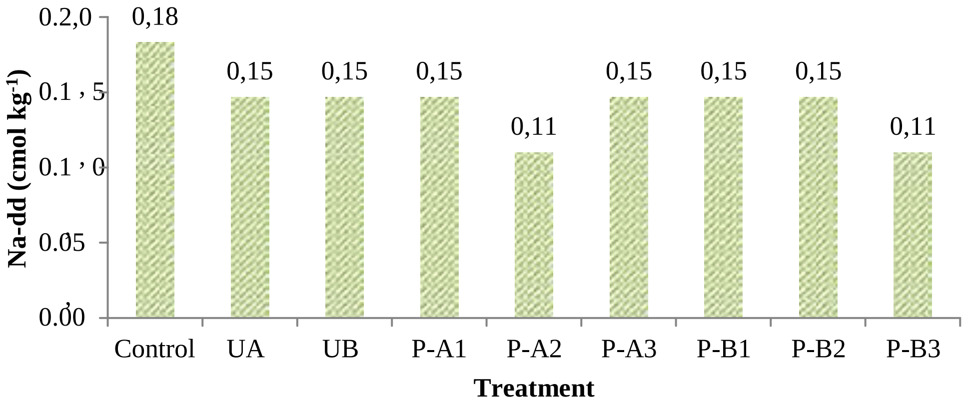
Based on Figure 4.8 shows that the lowest Mg-dd is in P-A3 treatment with Mg-dd content of 0.08 cmol $_{(+)}$ kg $^{-1}$. This is due to absorption nutrient Mg by plants and the antagonistic properties of Mg and Ca so that magnesium treatment P-A3 Becomes low. Thing this in accordance with Subandi (2013) , which states that magnesium absorption is affected by the ratio of Ca:Mg:K di soil

by statistics Mg-dd soil different no real however, there is the tendency that P-A1 was higher than the P-A2 and P-A3 treatments. Thing this also could seen on Picture 4.8 which show the more

The higher the PA dose, the higher the Mg-dd levels in the soil. This is presumably because PA have composition ingredient mixture ash fly coal (35% fromwhole). As explained by Sari (2019), gift ash fly could repair nature soil with increase availability elements macro and soil microelements such as P, K, Ca, Mg, Zn, and Cu.

4.10. Na-dd Tanah

Based on the results of the analysis of variance in Appendix 16 shows that treatment take effect no real to rate Na-dd soil. Thing this suspected because the ability of corn plants to absorb Na is very low so that During the anthesis phase of corn, the results of the analysis of soil Na-dd levels tended to be the same. According to Rosmarkam and Yuwono (2002) ability plant corn absorbNa is very low. Plants that have a very high Na absorption low, it is considered that the nutrient Na is less important for growth and production plant the.



Note: PA & PB : ATB-AZ:Urea [Dose]. UA & UB : [Dose] (Frequency Application)

Control : Without N . fertilizer	P-A1 : 70(50:50):30 [100%]	P-B1 : 70(40:60):30 [100%]
U-A : Urea [100%] (1x)	P-A2 : 70(50:50):30 [75%]	P-B2 : 70(40:60):30 [75%]
U-B : Urea [100%] (3x)	P-A3 : 70(50:50):30 [50%]	P-B3 : 70(40:60):30 [50%]

Picture 4.9. Average Na-dd land when the corn plant phase anthesis

Based on Figure 4.9 the lowest Na-dd was found in the P-A2 and P- B3 with a concentration of 0.11 cmol $_{(+)}$ kg $^{-1}$ according to the criteria of the Soil Research Center (1995), rate Na-dd on study this including criteria low. Na which low actually profitable because no element which essential. Content Nawhich tall in soil could damage structure soil so that soil Becomes congested.

Based on results average Na-dd (cmol $_{(+)}$ kg $^{-1}$) show that Na-dd highest there is on treat Control with rate Na-dd as big as 0.18 cmol $_{(+)}$ kg $^{-1}$
. This is thought to be due to an imbalance between Na ions and N, K, Ca, Mg at treatment Control. According to Tejada *et al* . (2009) addition ingredient organic tend could add availability K, Ca, Mg, N and P so that could balancing cations the in soil and plant. Effect from addition is the exchange of Na^+ for Ca^{2+} , which allows leaching sodium can be exchanged.

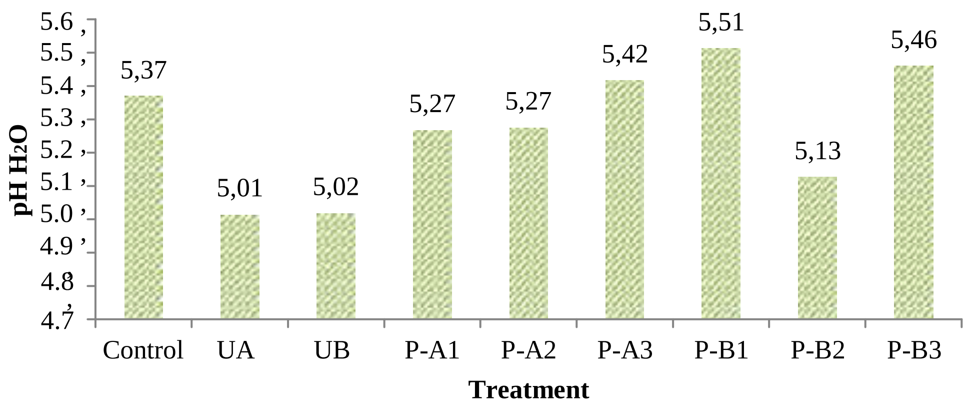
Statistically the Na-dd soil was not significantly different but in Figure 4.9 showed that there was a tendency that Na-dd in pellet fertilizer was lower than Na-dd urea fertilizer. This is suspected because the pellet fertilizer contains a mixture of ingredients organic so that influence availability Sodium in soil. According to Hardjowigeno (2010), influence ingredient organic to traits soil and as a result also against availability of nutrients other.

4.11. Soil Reaction (pH H2O) _

The results of the variance in Appendix 17 show that the treatment no significant effect on soil pH H_2O. This is because pH of treatment Pellet fertilizer is still classified as acidic, namely pH H_2O fertilizer PA of 6.65 and pH H2O fertilizer PB is 6.60 so that to increase soil pH it has no effect real.

The results of the average pH H_2O of the soil during the anthesis phase of corn plants showed that pH H_2O all the treatment reacts sourly with a pH between 5.01 to 5.51. The average yield of soil pH H_2O during the anthesis phase of corn plants on each treatment served in Picture 4.10.

Based on Picture 4.10 show that pH H2O _ _ all treatment acid reacts with a pH between 5.01 and 5.51. Overall that pH the soil when the corn plant in the anthesis phase does not meet the optimal pH for growth and development of maize ranging from 5.6 to 6.2 (Riwandi *et al* ., 2014).



Note: PA & PB : ATB-AZ:Urea [Dose]. UA & UB : [Dose] (Frequency Application)

Control : Without N . fertilizer	P-A1 : 70(50:50):30 [100%]	P-B1 : 70(40:60):30 [100%]
U-A : Urea [100%] (1x)	P-A2 : 70(50:50):30 [75%]	P-B2 : 70(40:60):30 [75%]
U-B : Urea [100%] (3x)	P-A3 : 70(50:50):30 [50%]	P-B3 : 70(40:60):30 [50%]

Picture 4.10. Average pH H_2O soil moment plant corn anthesis phase

Statistically the pH H_2O of the soil was not significantly different but in Figure 4.10 shows that there is a tendency for the pH of the soil H2O to be treated with pellet fertilizer higher than the pH H_2O of the soil treated with urea fertilizer. This is presumably because dose urea in treatment fertilizer pellet more a little compared dose urea in urea fertilizer treatment. According to Anggono (2018) the increase in urea dose is in line with with an increase in the amount of ammonium released to the soil. Lokasari (2009) suggested that fertilizers containing nitrogen in the form of ammonium or in form other could changed Becomes nitrate which caused on drop pH soil. Nitrification caused in production ions hydrogen and potential increase soil acidity.

Besides because dose urea, pH fertilizer pellet more tall from fertilizer pH urea It is also suspected that the pellet fertilizer contains a mixture of coal fly ash which can increase soil pH. According to the research of Yerizam *et al* . (2007) ash fly coal have SiO_3^{2-} as big as 50% and Al2O3 _ _ _ as big as 30% which has almost the same characteristics as zeolite so that it can be used as a ingredient mineral controller release nitrogen in urea through mechanism exchange

CHAPTER 5
CONCLUSION AND SUGGESTION

5.1 Conclusion

As for conclusion obtained from study this is

1. Treatment take effect very real to heavy safe dry and plant N uptake, only had a significant effect on the number of leaves and levels of N plants, however, had no significant effect on the content of K, Ca, Mg, Na and pH H_2O soil when corn plant phase anthesis.
2. Plant N uptake, number of leaves, dry weight of stover and plant N content which given treatment fertilizer pellet more tall compared treatment which given urea fertilizer.
3. The highest plant N uptake was found in the treatment with a mixed composition coal fly ash-azolla 70% (40:60) + 30% urea with recommended dosage 100% that is, with the rate absorption N of 0.81 g plant $^{-1}$.

5.2. Suggestion

It is necessary to test the application of pellet fertilizer made from coal fly ash, azolla biomass and urea in the field to see the effect of fertilizer application pellets on a field scale. In addition, further research is needed to plant harvested corn to determine efficiency use of pellet fertilizer.

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Attachment 1. Description hybrid corn varieties bisi-18

Release date	12 October 2004
Origin	Single cross F1 between pure strains FS46 as parent female and strain pure FS17 as parentmale
Age	50% go out hair
plain low	+ 57 days
plain tall	+ 70 days
Cook physiological	
plain low	+ 100 days
plain tall	+ 125 days
stem	Big, sturdy, strapping
Color stem	Green
Plant height	+ 230 cm
Leaf	Medium and upright
Color leaf	Green dark
Diversity plant	Uniform
Rooting	Well
lay down	Stand fall down
Form malai	Compact and a bit upright
Color husk	Purple greenish
Color anther	Purple redness
Color hair	Purple redness
Tall cob	+ 115 cm
Cornhusk	Close cob is enough good
Type seed	Semi pearl
Color seed	orange yellowish
Amount row/cob	14 - 16 lines
Weight 1000 seeds	+ 303 g
Average results	9.1 n/ha flaky dry
Potency results	12 n/ha flaky dry
Endurance	Stand to disease rust leaf dan leaf spot
Area development	Area which already normal plant corn hybridon season drought and rain, especially which want varieties aged early-medium
Information	Well planted in plains low until height 1000 m above sea level
Breeder	The fate of WW, Putu Darsana, MH Wahyudi, andPurwoko

(Body Study and Development Agriculture, 2013).

Appendix 2. Calculation of Dolomite requirement for 10 kg of

soilNeeds Dolomite for 10 kg of soil

Al-dd : 1.04 me $100g^{-1}$

Heavy Ground `: 2×10^6 kg ha^{-1} = 2×10^9

g ha^{-1}Method : 1x Al-dd

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need Calcite

BE $CaCO_3$ = $\frac{BM\ CaCO3}{VCa}$ = $\frac{100}{2}$ = 50 mg $CaCO_3$

$CaCO_3$ $100g^{-1}$ = 1,04 me/100g x 1 x 50 mg $CaCO_3$ = 52 mg $CaCO_3$ $100g^{-1}$

$CaCO_3$ has^{-1} = $\frac{2 \times 10^9\ g/\ has}{100g}$ x 52 mg $CaCO_3$ = 1040 kg $CaCO_3$ has^{-1}

$CaCO_3$ / 10 kg tanah:

= $\frac{10\ kg}{2 \times 10^6\ kg/ha}$ x 1040 kg $CaCO_3$ / ha = 5.2 x 10^3 kg / 10 kg soil = 5.2 g $polybag^{-1}$

Dolomite Needs

CaO = 30%

MgO=20%

MgO ~ CaO = $\frac{BM\ CaO}{BM\ MgO}$ x %MgO Dolomit = = $\frac{56}{40}$ x 20% = 28%

Content $(CaMg(CO)_3)_2$) CaO equivalent = 30% + 28% =

58%Needs Dolomite = $\frac{56}{58}$ x 5.2 g $polybag^{-1}$ = 5.02 g

$polybag^{-1}$

Appendix 3. Fertilizer

calculationFertilizer SP-36 base

and KCl

SP-36 : 250 kg ^{1} . Applied when plant.KCl :
150 kg ^{1} . Applied when plant.

Needs SP-36
$\frac{10 \text{ kg}}{2 \text{ x } 10^{6} \text{ kg/ha}}$ x 250 kg ^{1} = 0.00125 kg polybag ^{1} = 1.25 g polybag ^{1}

Needs KCl
$\frac{10 \text{ kg}}{2 \text{ x } 10^{6} \text{ kg/ha}}$ x 150 kg ^{1} = 0.00075 kg polybag ^{1} = 0.75 g polybag ^{1}

Fertilizer Treatment Fertilizer Pellet and Urea

Dose Recommendations : 138 kg N ha ^{1}
Soil Weight 10 kg Needs

Fertilizer P-A1

138 kg N ha^{-1} x $\frac{100}{100}$ x $\frac{100}{9{,}41}$ = 1.466,54 kg ha^{-1}
1.466,54 kg ha^{-1} x $\frac{10 \text{ kg}}{2 \text{ x } 10^{6} \text{ kg/ha}}$ = 0.00733 kg polybag ^{1} = 7.33 g polybag ^{1}

Needs Fertilizer P-A2

138 kg N ha^{-1} x $\frac{75}{100}$ x $\frac{100}{9{,}41}$ = 1.009,89 kg ha^{-1}
1.009,89 kg ha^{-1} x $\frac{10 \text{ kg}}{2 \text{ x } 10^{6} \text{ kg/ha}}$ = 0.00549 kg polybag ^{1} = 5.49 g polybag ^{1}

Needs Fertilizer P-A3

138 kg N ha^{-1} x $\frac{50}{100}$ x $\frac{100}{9{,}41}$ = 733,24 kg ha^{-1}
733,24 kg ha^{-1} x $\frac{10 \text{ kg}}{2 \text{ x } 10^{6} \text{ kg/ha}}$ = 0.00366 kg polybag ^{1} = 3.66 g polybag ^{1}

Needs Fertilizer P-B1

138 kg N ha^{-1} x $\frac{100}{8{,}46}$ = 1631,20 kg ha^{-1}
1631,20 kg ha^{-1} x $\frac{10 \text{ kg}}{2 \text{ x } 10^{6} \text{ kg/ha}}$ = 0.00815 kg polybag ^{1} = 8.15 g polybag ^{1}

Needs P-B2 . Fertilizer

138 kg N ha^{-1} x $\frac{75}{100}$ x $\frac{100}{8{,}46}$ = 1141,84 kg ha^{-1}
1141,84 kg ha^{-1} x $\frac{10 \text{ kg}}{2 \text{ x } 10^{6} \text{ kg/ha}}$ = 0.00611 kg polybag ^{1} = 6.11 g polybag ^{1}

Needs P-B3 Pupuk Fertilizer

$138 \text{ kg N ha}^{-1} \times \frac{50}{100} \times \frac{100}{8,46} = 780,14 \text{ kg ha}^{-1}$

$780,14 \text{ kg ha}^{-1} \times \frac{10 \text{ kg}}{2 \times 10^{6} \text{ kg/ha}} = 0.00407 \text{ kg polybag}^{1} = 4.07 \text{ g polybag}^{1}$

Needs Urea-A . Fertilizer

$138 \text{ kg N ha}^{-1} \times \frac{100}{46} = 300 \text{ kg ha}^{-1}$

$300 \text{ kg ha}^{-1} \times \frac{10 \text{ kg}}{2 \times 10^{6} \text{ kg/ha}} = 0.00150 \text{ kg polybag}^{1} = 1.50 \text{ g polybag}^{1}$

Needs Urea-B . Fertilizer

$138 \text{ kg N ha}^{1} \times \frac{100}{46} = 300 \text{ kg ha}^{1}$

Dose Urea-B 30% Moment plant

$300 \text{ kg ha}^{1} \times \frac{10 \text{ kg}}{2 \times 10^{6} \text{ kg/ha}} \times \frac{30}{100} = 0.00045 \text{ kg polybag}^{1} = 0.45 \text{ g polybag}^{1}$

Dosis Urea-B 35% Pada 15 hst

$300 \text{ kg ha}^{-1} \times \frac{10 \text{ kg}}{2 \times 10^{6} \text{ kg/ha}} \times \frac{35}{100} = 0.000525 \text{ kg polybag}^{1} = 0.525 \text{ g polybag}^{1}$

Dose Urea-B 35% At 30 hst

$300 \text{ kg ha}^{1} \times \frac{10 \text{ kg}}{2 \times 10^{6} \text{ kg/ha}} \times \frac{35}{100} = 0,000525 \text{ kg polibag}^{-1} = 0,525 \text{ g polibag}^{-1}$

Attachment 4. Potential N content of pellet fertilizer from coal fly ash, azolla and urea as well as score dose equivalence PA fertilizer and PB with Urea

Potency rate nitrogen PA (70(50:50):30)

Urea = $\frac{30}{100}$ x 46% = 13.8%

Ash fly coal = $\frac{35}{100}$ x 0.11% = 0.0385%

Azolla = $\frac{35}{100}$ x 1.85% = 0.6475%

Potency rate nitrogen PA = 14.486%

Potency rate nitrogen PB (70(40:60):30)

Urea = $\frac{30}{100}$ x 46% = 13.8%

Ash fly coal = $\frac{28}{100}$ x 0.11% = 0.0308%

Azolla = $\frac{42}{100}$ x 1.85% = 0.777%

Potency rate nitrogen PB = 14.608%

Equivalence dose of PA and PB fertilizers with

UreaDick : N . level on urea fertilizer = 46%

N content in PA fertilizer = 9.41%

N levels in PB fertilizer = 8.46%

Dit : How much PA and PB are needed to producerate N equivalent 1 gram of urea?

Solution :

Content N at 1 grams urea = 1 grams x $\frac{46}{100}$ = 0.46 grams

To produce a N content of 0.46 grams or the equivalent of 1 gram of urea, then needed PA and PB as much as:

Heavy PA = 0.46 grams x $\frac{100}{9.41}$ = 4.89 grams

Heavy PB = 0.46 grams x $\frac{100}{8.46}$ = 5.44 grams

With thereby, content N in :

1 gram of urea is equivalent to 4.89 grams of

PA fertilizer1 grams of urea equivalent with

5.44 grams of fertilizer PB

While the average weight of each pellet is 0.70 grams, so that1

grams of urea equivalent with ± 7 grains of PA fertilizer

1 grams of urea equivalent with ± 8 grains of fertilizer PB

Attachment 5. Mean and analysis of variance in the number of leaves of corn plants phaseanthesis (sheet plant $^{-1}$) .

Treatment	Amount leaf (plant $^{-1}$) on test			Amount	Average
	1	2	3		
Control	9	9	9	27	9.0
HAS BEEN	10	11	10	31	10.3
UB	11	9	11	31	10.3
P-A1	11	11	10	32	10.7
P-A2	10	14	12	36	12.0
P-A3	11	11	11	33	11.0
P-B1	11	12	13	36	12.0
P-B2	11	12	11	34	11,3
P-B3	11	13	11	35	11,7
Total				295	
Rerata					10,93

SK	DB	JK	KT	F-Hit	F-Table 5%	F-Table 1%
Perlakuan	8	22,5185	2,8148	2,92 *	2,51	3.71
Error	18	17.3333	0.9630			
Total	26	39.8519				
KK=	8.98					

Information : * = take effect real

Attachment 6. Orthogonal test results contrast amount leaf plant corn phase anthesis.

SK	DB	JK	KT	F-Hit	F-Table 5%	F-Table 1%
Treatment	8	22.52	2.81	2.92 *	2.51	3.71
Control (K) vs Fertilizer N	1	12.52	12.52	13.00 **	4.41	8.29
Pellet Fertilizer vs Urea	1	5.56	5,56	5,77 *	4,41	8,29
Urea A vs Urea B	1	0,00	0,00	0,00 tn	4,41	8,29
PA vs PB	1	0,89	0,89	0,92 tn	4,41	8,29
PA1 vs PA2,PA3	1	1,39	1,39	1,44 tn	4,41	8,29
PA2 vs PA3	1	1,50	1,50	1,56 tn	4,41	8,29
PB1 vs PB2,PB3	1	0,50	0,50	0,52 tn	4,41	8,29
PB2 vs PB3	1	0,17	0,17	0,17 tn	4,41	8,29
Galat	18	17.33	0.96			
Total	26	39.85				
KK=	8.98					

Information : ** = different very real, * = different real, tn = different no real.

Attachment 7. The mean and analysis of the variance of the dry weight of the dry stovercorn phase anthesis (g plant $^{-1}$) .

Treatment	Heavy dry stove (g plant $^{-1}$) on test			Amount	Average
	1	2	3		
Control	5.52	9.99	3.48	18.99	6.33
HAS BEEN	13.05	9.01	6.99	29.05	9.68
UB	15.64	6,18	16.09	37.91	12.64
P-A1	22.37	31.07	23.97	77.41	25.80
P-A2	17.57	22.71	40.47	80.75	26.92
P-A3	21.77	27.53	21.33	70,63	23,54
P-B1	29,48	32,94	23,00	85,42	28,47
P-B2	15,43	20,42	26,98	62,83	20,94
P-B3	31,31	14,03	21,25	66,59	22,20
Total				529,58	
Rerata					19,61

SK	DB	JK	KT	F-Hit	F-Tabel	
					5%	1%
Treatment	8.00	1553,30	194.16	4.80 **	2.51	3.71
Error	18.00	728,10	40.45			
Total	26.00	2281.40				
KK=	32.43					

Information : ** = very influential real

Attachment 8. The results of the orthogonal contrast test on the dry weight of the corn plant phaseanthesis.

SK	DB	JK	KT	F-Hit	F-Table	
					5%	1%
Treatment	8	1553,30	194.16	4.80 **	2.51	3.71
Control (K) vs Fertilizer N	1	595.57	595.57	14.72 **	4.41	8.29
Pellet Fertilizer vs Urea	1	818,44	818,44	20,23 **	4,41	8,29
Urea A vs Urea B	1	13,08	13,08	0,32 tn	4,41	8,29
PA vs PB	1	10,81	10,81	0,27 tn	4,41	8,29
PA1 vs PA2,PA3	1	0,66	0,66	0,02 tn	4,41	8,29
PA2 vs PA3	1	17,07	17,07	0,42 tn	4,41	8,29
PB1 vs PB2,PB3	1	95,31	95,31	2,36 tn	4,41	8,29
PB2 vs PB3	1	2,36	2,36	0,06 tn	4,41	8,29
Error	18	728,10	40.45			
Total	26	2281.40				
KK=	32.43					

Information : ** = different very real, mr = different not real.

Attachment 9. Mean and analysis of variance of N levels of maize in anthesis phase(g 100g $^{-1}$)

Treatment	Rate N plant (g 100g $^{-1}$) on test			Amount	Average
	1	2	3		
Control	2,382	2.045	1,961	6,388	2,129
HAS BEEN	2,466	2.41	2,102	6,978	2,326
UB	2,158	2,606	2,033	6,797	2,266
P-A1	2,970	2,690	2,970	8,630	2,877
P-A2	2,466	2,410	2,102	6,978	2,326
P-A3	2,382	2,298	2,606	7,286	2,429
P-B1	2,522	3,054	2,914	8,490	2,830
P-B2	2,438	2,326	2,914	7,678	2,559
P-B3	2,662	2,522	2,382	7,566	2,522
Total				66,791	
Rerata					2,474

SK	DB	JK	KT	F-Hit	F-Table 5%	F-Table 1%
Perlakuan	8	1,5196	0.1899	3.70 *	2.51	3.71
Error	18	0.9237	0.0513			
Total	26	2.4433				
KK=	9.16					

Information : * = take effect real

Attachment 10. Result orthogonal test contrast N . level plant corn phase anthesis.

SK	DB	JK	KT	F-Hit	F-Table 5%	F-Table 1%
Treatment	8	1.52	0.19	3.70 *	2.51	3.71
Control (K) vs Fertilizer N	1	0.40	0.40	7.80 *	4.41	8.29
Pellet Fertilizer vs Urea	1	0.39	0.39	7.61 *	4.41	8.29
Urea A vs Urea B	1	0.01	0.01	0.11 mr	4.41	8.29
PA vs PB	1	0,04	0,04	0,76 tn	4,41	8,29
PA1 vs PA2,PA3	1	0,50	0,50	9,72**	4,41	8,29
PA2 vs PA3	1	0,02	0,02	0,31tn	4,41	8,29
PB1 vs PB2,PB3	1	0,17	0,17	3,26tn	4,41	8,29
PB2 vs PB3	1	0,00	0,00	0,04 tn	4,41	8,29
Galat	18	0,92	0,05			
total	26	2,44				
KK=	9,16					

Information : ** = different very real, * = different real, tn = different no real.

Attachment 11. Mean and analysis of variance of N uptake levels of maize phase anthesis (g plant $^{-1}$)

Treatment	Absorption N plant (g crop $^{-1}$) on test			Amount	Average
	1	2	3		
Control	0.13	0.20	0.07	0.40	0.13
UA	0.32	0.22	0.15	0.69	0.23
UB	0.34	0.16	0.33	0.83	0.28
P-A1	0.66	0.84	0.71	2,21	0.74
P-A2	0,43	0.55	0.85	1,83	0.61
P-A3	0.52	0.63	0.56	1,71	0.57
P-B1	0.74	1,01	0,67	2,42	0.81
P-B2	0.38	0.47	0,79	1,64	0.55
P-B3	0.83	0.35	0.51	1.69	0.56
Total				13.42	
Rerata					0.50

SK	DB	JK	KT	F-Hit	F-Table	
					5%	1%
Treatment	8	1,293	0.162	6.71 **	2.51	3.71
Error	18	0.434	0.024			
Total	26	1,727				
KK =	31.25					

Information : ** = very influential real

Attachment 12. The results of the orthogonal contrast test for the N uptake rate of phase corn plantsanthesis.

SK	DB	JK	KT	F-Hit	F-Table	
					5%	1%
Treatment	8	1,293	0.162	6.71 **	2.51	3.71
Control (K) vs Fertilizer N	1	0.443	0.443	18.37 **	4.41	8.29
Pellet Fertilizer vs Urea	1	0.674	0.674	27.96 **	4.41	8.29
Urea A vs Urea B	1	0.003	0.003	0.14 mr	4.41	8.29
PA vs PB	1	0,000	0,000	0,00 tn	4,41	8,29
PA1 vs PA2,PA3	1	0,044	0,044	1,81 tn	4,41	8,29
PA2 vs PA3	1	0,003	0,003	0,11 tn	4,41	8,29
PB1 vs PB2,PB3	1	0,126	0,126	5,24 *	4,41	8,29
PB2 vs PB3	1	0,001	0,001	0,02 tn	4,41	8,29
Galat	18	0,434	0,024			
Total	26	1,727				
KK=	31,25					

Information : ** = different very real, * = different real, tn = different no real.

Attachment 13. Average and analysis fingerprint variety rate K-dd land when plantcorn phase anthesis (cmol $_{(+)}$ kg $^{-1}$).

Treatment	Rate K-dd soil (cmol $_{(+)}$ kg $^{-1}$) on ulangan			Jumlah	Rerata
	1	2	3		
Kontrol	0.03	0.03	0.02	0.08	0.027
UA	0.03	0.05	0.03	0.11	0.037
UB	0.03	0.02	0.03	0.08	0.027
P-A1	0.03	0.03	0.03	0.09	0,030
P-A2	0.03	0.03	0.02	0.08	0.027
P-A3	0.03	0.03	0.02	0.08	0.027
P-B1	0.02	0.03	0.02	0.07	0.023
P-B2	0.03	0.03	0.04	0,10	0.033
P-B3	0.02	0.03	0.02	0.07	0.023
Total				0.76	
Rerata					0.28

SK	DB	JK	KT	F-Hit	F-Table	
					5%	1%
Treatment	8	0.0005	0.0001	1.82 ^{tn}	2.51	3.71
Error	18	0.0007	0.0000			
Total	26	0.0012				
KK=	21.62					

Information : tn = take effect not real

Attachment 14. Average and analysis fingerprint variety rate Ca-dd current land plantcorn phase anthesis (cmol $_{(+)}$ kg $^{-1}$).

Treatment	Rate Ca-dd soil (cmol $_{(+)}$ kg $^{-1}$) on test			Amount	Average
	1	2	3		
Control	1.13	0.75	0.80	2.68	0.89
UA	0.53	0.83	0.73	2.09	0.70
UB	0.83	0.88	0.65	2,36	0,79
P-A1	0.38	0.75	0.63	1,76	0.59
P-A2	0.53	0,45	0,70	1,68	0.56
P-A3	0.73	0.83	0,68	2,24	0.75
P-B1	0.73	0.91	0,50	2,14	0.71
P-B2	0,20	0,60	0,70	1,50	0,50
P-B3	0.73	0.85	0.60	2.18	0.73
Total				18.63	
Rerata					0.69

SK	DB	JK	KT	F-Hit	F-Table 5%	F-Table 1%
Treatment	8	0.3585	0.0448	1.52 yrs	2.51	3.71
Error	18	0.5325	0.0296			
Total	26	0.8910				

KK = 24.93

Information : tn = take effect not real

Attachment 15. Mean and analysis of variance of soil Mg-dd levels at plant corn phase anthesis (cmol $_{(+)}$ kg $^{-1}$).

Treatment	Rate Mg-dd soil (cmol $_{(+)}$ kg $^{-1}$) on ulangan			Jumlah	Rerata
	1	2	3		
Kontrol	0.53	0.03	0,20	0.76	0.25
UA	0.08	0.23	0.28	0.59	0,20
UB	0.13	0.13	0.15	0,41	0.14
P-A1	0.18	0.38	0.05	0.61	0,20
P-A2	0.08	0.28	0.05	0,41	0.14
P-A3	0.05	0.03	0.15	0.23	0.08
P-B1	0,00	0,10	0.25	0.35	0,12
P-B2	0,10	0.25	0.18	0.53	0.18
P-B3	0.08	0,00	0.25	0.33	0.11
Total				4,22	
Rerata					0.16

SK	DB	JK	KT	F-Hit	F-Table 5%	F-Table 1%
Treatment	8	0.0735	0.0092	0.51 ^{tn}	2.51	3.71
Error	18	0.3215	0.0179			
Total	26	0.3950				

KK= 85.51

Information : tn = take effect not real

Attachment 16. Average and analysis variance rate Na-dd current land plant corn phase anthesis (cmol $_{(+)}$ kg $^{-1}$).

Treatment	Rate Na-dd soil (cmol $_{(+)}$ kg $^{-1}$) on test			Amount	Average
	1	2	3		
Control	0.22	0.11	0.22	0.55	0.18
UA	0.11	0.22	0.11	0.44	0.15
UB	0.11	0.22	0.11	0.44	0.15
P-A1	0.22	0.11	0.11	0.44	0.15
P-A2	0.11	0.11	0.11	0.33	0.11
P-A3	0.11	0.11	0.22	0.44	0.15
P-B1	0.11	0.22	0.11	0.44	0.15
P-B2	0.11	0.11	0.22	0.44	0.15
P-B3	0.11	0.11	0.11	0.33	0.11
Total				3.85	
Average					0.14

SK	DB	JK	KT	F-Hit	F-Table 5%	F-Table 1%
Treatment	8	0.0117	0.0015	0.46 tn	2.51	3.71
Error	18	0.0565	0.0031			
Total	26	0.0681				
KK=	39.28					

Information : tn = take effect not real

Attachment 17. Average and analysis fingerprint variety pH H2O _ _ soil moment plant cornphase anthesis.

Treatment	pH H_2O soil at test			Amount	Average
	1	2	3		
Control	5.34	5.19	5.58	16.11	5.37
UA	5.03	4.91	5,10	15.04	5.01
UB	4.91	4.96	5.18	15.05	5.02
P-A1	5.40	5,23	5,17	15,80	5,27
P-A2	4,58	5,72	5,52	15,82	5,27
P-A3	5,46	5,38	5,41	16,25	5,42
P-B1	5,20	5,27	6,07	16,54	5,51
P-B2	4,77	5,51	5,10	15,38	5,13
P-B3	5,53	5,37	5,48	16,38	5.46
Total				142.37	
Rerata					5.27

SK	DB	JK	KT	F-Hit	F-Table	
					5%	1%
Treatment	8	0.8321	0.1040	1.12 yrs	2.51	3.71
Error	18	1,6655	0.0925			
Total	26	2,4976				

KK = 5,769

Information : tn = take effect not real

Attachment 18. Results average, anova and test orthogonal contrast rate N-total soilmoment corn plant phase anthesis (%)

Treatment	N-total levels soil (%) on test			Amount	Average
	1	2	3		
Control	0.073	0.073	0.067	0.213	0.071
UA	0.062	0.073	0.078	0.213	0.071
UB	0.073	0.073	0.067	0.213	0.071
P-A1	0.056	0.073	0.067	0.196	0.065
P-A2	0,101	0.095	0.095	0,291	0.097
P-A3	0.067	0.062	0.062	0.191	0.064
P-B1	0.067	0.078	0.084	0,229	0.076
P-B2	0.078	0.078	0.095	0.251	0.084
P-B3	0.078	0.078	0.084	0.240	0.080
Total				2,037	
Rerata					0.075

SK	DB	JK	KT	F-Hit	F-Table 5%	F-Table 1%
Treatment	8	0.00256	0.00032	7,82511 **	2.51	3.71
Error	18	0.00074	0.00004			
Total	26	0.00330				

Information : ** = very real effect

Treatment	N-total Land (%)			F-Count	F-Table 5%	F-Table 1%
Control (K) vs Fertilizer N	0.071	vs	0.076	1.63 mr	4.41	8.29
Pellet Fertilizer vs Urea	0.078	vs	0,071	4,89 *	4,41	8,29
Urea-A vs Urea-B	0,071	vs	0,071	0,00 tn	4,41	8,29
P-A vs P-B	0,113	vs	0,080	2,39 tn	4,41	8,29
P-A1 vs P-A2,P-A3	0,065	vs	0,081	11,00 **	4,41	8,29
P-A2 vs P-A3	0,097	vs	0,064	40,72 **	4,41	8,29
P-B1 vs P-B2,P-B3	0,076	vs	0,082	1,48 tn	4,41	8,29
P-B2 vs P-B3	0.084	vs	0.080	0.49 mr	4.41	8.29

Information : ** = different very real, * = different real, tn = different no real.Source : Sari (2019)

Appendix 19. Criteria assessment properties chemistry land

Soil Properties	Unit	Value				
		Very much Low	Redah	Medium	Height	Very much Height
C	%	<1.00	1.00-2.00	2.01-3.00	3.01-5.00	> 5.00
N	%	<0.10	0.10-0.20	0,21-0,50	0,51-0,75	>0,75
P	Ppm	< 10	10-15	16-25	26-35	>35
KTK	$cmol_{(+)}kg^{-1}$	< 5	5-16	17-24	25-40	>40
K	$cmol_{(+)}kg^{-1}$	< 0,1	0,1-0,2	0,3-0,5	0,6-1,0	>1,0
Na	$cmol_{(+)}kg^{-1}$	< 0,1	0,1-0,3	0,4-0,7	0,8-1,0	>1,0
Mg	$cmol_{(+)}kg^{-1}$	< 0,4	0,4-1,0	1,-2,0	2,1-8,0	>8,0
Ca	$cmol_{(+)}kg^{-1}$	< 2	2-5	6-10	11-20	>20
KB	$cmol_{(+)}kg^{-1}$	< 20	20-35	36-50	51-70	> 70
Al	$cmol_{(+)} kg^{-1}$	<10	10-20	21-30	31-60	> 60
pH H_2O	Very much sour	Sour	Quite sour	Neutral	Quite Alkalis	Alkalis
	<4.5	4.5-5.5	5,6-6.5	6.6-7.5	7,6-8,5	>8.5

Source : Center Study Soil (1995)

Attachment 20. Picture activity study

Taking soil in Arboretum

Drying soil

sifting soil

Making fertilizer pellet

Fertilizer pellet PA and PB

Analysis rate water soil

Weighing 10 kg heavy drysoil absolute

Results fertilizer weighing pellet

Giving chalk dolomite

Corn bisi 18

Installation label treatment

Fertilization base

Giving treatment Urea fertilizer

Giving treatment fertilizer pellet

Selection seed corn

planting seed corn

Plant corn age 2 MST

Selection plant corn

Fertilization UB 15 HST

Fertilization UB 30 HST

Plant corn 8 MST

Plant phase corn anthesis


Harvest plant corn


Taking sample soil end

Weighing heavy safe wet


Oven

Weighing heavy safe dry


Grinding dry stoveuse blender


Sample plant which ready analyzed


Sample soil which ready analyzed

Analysis pH soil

Analysis N plant

Analysis small talk soil

ATTACHMENT