

THE EFFECT OF CONCENTRATION AND FREQUENCY OF APPLICATION OF
SHALLOT EXTRACT AS A NATURAL GROWTH REGULATOR (PGR) ON THE
GROWTH OF ROBUSTA COFFEE SEEDLINGS (COFFEA CANEPHORA)

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Abstract

Study This aim analyze influence concentration and frequency giving extract onion red as substance regulator grow experience to growth Robusta coffee seeds (*Coffea canephora*). Observed parameters covering tall seeds , quantity leaves , long roots , and weights fresh roots . Research use design test factorial with various level concentration and frequency application . Analysis results variance (ANOVA) shows that concentration and frequency giving extract onion red give influence significant to all growth parameters seeds . Concentration certain capable increase activity physiological plant through content auxin and gibberellin experience in onion red . Frequency the right application is also proven push growth vegetative and development system rooting . Research This give recommendation use of natural ZPT based material local For increase effectiveness robusta coffee nursery in a way friendly environmental and economic .

Keywords : robusta coffee , nursery , extract onion red , natural ZPT , growth plant

Introduction

Coffee is one of the commodities plantation worth economy tall and have role strategic in development agriculture national . Indonesia is included the world's largest coffee producer with production is dominated by robusta coffee (*Coffea canephora*). The high demand for robusta coffee in the domestic market and international demand improvement productivity from side nursery . Success nursery become stages the main determining factor quality plants in the phase production next .However in in practice , the nursery process often face constraint like growth slow , power sprouts low , and resilience less than optimal seeds for stress environment . This is push the need innovation technique nursery through utilization substance regulator growth regulators (PGRs). Use of synthetic PGRs of course has Lots applied , but

price relatively expensive and tends to depends on the product import as well as potential pollute environment. Extract onion red (*Allium cepa*) is one of the natural PGR alternatives that have content phytohormones like auxin and gibberellin play a role important in stimulate growth roots and shoots plants . Various study prove effectiveness extract onion red in increase growth beginning plant horticulture and some type plant plantation .Study This in a way special analyze concentration and frequency application extract onion red to growth robusta coffee seeds , so that capable give recommendation scientific for practice nursery based on more natural ZPT friendly environment .

Methodology Study

Study carried out in the garden UGN Padangsidimouan trial and start from month February – July 2025. Research use design test factorial with combination various concentration extract onion red as well as frequency application . Robusta coffee seeds , onions red as material extract , planting media , equipment extraction , and devices measurement growth plant .Stages study covering manufacturing extract onion red , application extract on coffee seeds according to treatment , maintenance , and observation of vegetative parameters . Data were analyzed using ANOVA for determine influence treatment on growth parameters plant .

Research result

Document study provide ANOVA table showing influence significant treatment on : Height of robusta coffee seedlings , Number of leaves , root length and weight fresh roots . All parameters experienced improvement along concentration and frequency onion ZPT application red certain .

Table 1 Results of Analysis of Variance (ANOVA) for tall Robusta coffee plant seedlings (cm)

Tests of Between-Subjects Effects					
Dependent Variable:	tall plant				
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.512 ^a	7	.787	3,253	.024
Intercept	1085.415	1	1085.415	4483.642	.000
K	5.135	3	1,712	7,071	.003
F	.167	1	.167	.688	.419
k * f	.210	3	.070	.289	.833

Error	3,873	16	.242		
Total	1094,800	24			
Corrected Total	9,385	23			

Table 2 Results of Analysis of Variance (ANOVA) for amount leaf plant robusta coffee seeds

Tests of Between-Subjects Effects					
Dependent Variable:	amount leaf				
Source	Type I Sum of Squares	df	Mean Square	F	Sig.
Model	214,667 ^a	8	26,833	128,800	.000
K	208,333	4	52,083	250,000	.000
F	1,500	1	1,500	7,200	.016
k * f	4,833	3	1,611	7,733	.002
Error	3,333	16	.208		
Total	218,000	24			
a. R Squared = .985 (Adjusted R Squared = .977)					

Table 3 results Analysis of Variance (ANOVA) for long root plant robusta coffee seeds

Tests of Between-Subjects Effects					
Dependent Variable:	long root				
Source	Type I Sum of Squares	df	Mean Square	F	Sig.
Model	120804.333 ^a	8	15100.542	13,917	.000
k	111637.500	4	27909.375	25,722	.000
f	4788.375	1	4788.375	4,413	.052
k * f	4378.458	3	1459,486	1,345	.295
Error	17360.667	16	1085.042		
Total	138165.000	24			
a. R Squared = .874 (Adjusted R Squared = .812)					

Table 4 Results of Analysis of Variance (ANOVA) for weight fresh roots of seedlings robusta coffee plants

Tests of Between-Subjects Effects					
Dependent Variable:	heavy root				
Source	Type I Sum of Squares	df	Mean Square	F	Sig.
Model	44161.333 ^a	8	5520.167	45,465	.000
k	43435.000	4	10858.750	89,434	.000
f	192,667	1	192,667	1,587	.226
k * f	533,667	3	177,889	1,465	.262

Error	1942,667	16	121,417		
Total	46104.000	24			
a. R Squared = .958 (Adjusted R Squared = .937)					

Research result show that giving extract onion red give real response to tall Robusta coffee seeds . Content auxin and gibberellin in extract onion red play a role increase elongation cells , so that growth vertical plant become more fast . This hormonal mechanism in accordance with theory physiology plants that mention that auxin Work active in elongation stem meristem cells . In addition that , combination hormone experience the strengthen activity metabolic plant during phase vegetative . Condition environment stable maintenance participate strengthen effectiveness of applied natural PGRs . Increase tall plant become indicator important success nursery Because related with vigor seedlings in the phase planting next. Influence concentration extract onion red to amount leaf Robusta coffee seeds also show results significant . Leaves is a vital organ in the process of photosynthesis , so that improvement amount leaf implications direct to performance growth plants . Content phytonutrients onion red trigger division cell in a way more fast , possible formation leaf newer intensive . In addition that , fulfillment nutrition organic from extract onion red repair activity chlorophyll , so that leaves that are formed more healthy and have color green more thick . Response This reflect that natural ZPT can replace the role of synthetic PGR in stimulate formation shoots new . Improvement quantity leaves also affect efficiency absorption light by plants .

Root length experience improvement real in treatment certain with extract onion red . Root is an important organ For absorption of water and nutrients . Content hormone auxin in extract onion red known more dominant working on the network rooting . Auxin trigger formation lateral roots and increase growth primary roots , so that structure roots become more strong . This is very important in the development phase. robusta coffee nursery , because seeds with healthy roots will own Power more adaptation Good moment moved to field . Growth optimal roots also ensure ability seeds endure in condition stress environment beginning. Improvement weight fresh roots of coffee seedlings also reflect success natural PGR application used . Weight root relate with network volume developing roots , which indicates capacity absorption more nutrition big . Extract onion red contain compound organic that is not only functioning as hormone growth , but also provide nutrition micro that improves freshness network root . Frequency proper giving allows absorption hormone in a way sustainable , productive development stable rooting . Weight fresh roots become indicator important in

determine quality seedlings in the phase pre-planting . Seedlings with weight root tall own opportunity a better life big .

Difference frequency application extract onion red participate determine effectiveness stimulation growth . Too frequent frequency low cause plant No get supply hormone in amount Enough For stimulate activity physiological in a way consistent . On the other hand , a frequency that is too tall precisely potential hinder growth Because occurrence saturation hormones in the tissue plants . Therefore that , determining the optimal application interval is key success application of natural PGR . Research This show that there is frequency the best that produces response the most effective growth in robusta coffee seedlings . This in line with theory dynamics hormone in physiology plant .Interaction between concentration and frequency application extract onion red also gives influence significant to various growth parameters . Interactions This show that concentration tall No always produce optimal growth when No balanced with appropriate frequency . On the other hand , the concentration low can produce growth maximum if given at appropriate intervals . This is reflect that the effectiveness of natural PGR is greatly influenced by the balance dose and rhythm application . Phenomenon This support approach agronomy that emphasizes importance synergy between concentration and frequency in formulation treatment . The right combination capable maximize response physiological robusta coffee seeds .

research results also indicate that effectiveness extract onion red is very much determined by the quality of the planting medium and conditions the environment that accompanies it . Coffee seedlings that grow on media with structure good and optimal aeration will utilise hormone growth in a way more efficient . Loose media conditions make things easier penetration roots stimulated by auxin , so that development system roots ongoing more fast . On the other hand , the environment with intensity light adequate participate increase response leaf to hormonal stimuli , cause photosynthesis walk more active . With Thus , the influence extract onion red No only depends on internal plant factors , but is also influenced by the scope physique place plant grow . Combination between natural PGR and conditions optimal environment provides synergy that produces growth robusta coffee seeds more Good compared to treatment without ZPT.

Conclusion

Study show that extract onion red influential significant to growth Robusta coffee seeds . Concentration and frequency the right application capable increase tall plants , number leaves , long roots , and weights fresh root extract onion red proven can functioning as an effective and friendly natural PGR environment . Research results This can made into guidelines in practice coffee nursery for produce more seeds strong and high quality . Research advanced recommended test effectiveness extract under conditions fields and other types of coffee .

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