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Effects of foliar spray of Molybdenum Nanoparticles and phosphor fertilizer on production Medical active substances and chemical structure in yellow sweet clover (*Melilotus officinalis* L.)

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Abstract:

Field experiment conducted at two summer season 2020-2021 and 2021-2022 on clay sandy soil in Al-Diwanyia. The experiment was design as Complete Randomized Block Design with three replications arranged for split-pilot design, and Least Significant differences $_{0.05}$ the main treatment contend two level of phosphor [Iam used Triple Super phosphate because it raised Ph to alkaline of soil and provide good environment to Rhizobium than Single superphosphate which raised acidic of soil and provided good environment to fungi in future experiment] (0 , 20 kg.ha⁻¹) within their four levels of Mo Nanoparticles (MoNPs)(0 , 10 , 20 , 30) mg.l⁻¹. and irrigated every 3 days I took sample of soil before planting to analysis it and to learn physical and chemical properties table 1. Yellow clover Seeds sowing at rate 20 kg. ha⁻¹(1 cm depth) at 1/4, after 7 months I took a samples to measure. The results showed all factors and interactions were significant effect and produce three medical active substances Dioxolane ,Ethylamine , Benzaldehyde and protein , carbohydrates ,Fats , total chlorophyll , forage yield and their max values respectively(2.72 , 2.35 , 3.08 , (17.89 , 5.69 , 0.99)% , 2.88 mg. 2g⁻¹ , 1.71 T.ha⁻¹) in interaction 20 kg.ha⁻¹ and 30 mg.l⁻¹ while the min values respectively (0.02 , 0.02 , 0.02 , (16.19 , 4.92 , 0.85)% , 2.38 mg.2g⁻¹ and 1.12 T.ha⁻¹) in the interaction of 0 kg.ha⁻¹ and 0 mg. l⁻¹ MoNPs t.

Keywords: phosphor fertilizer, Foliar spray, Yellow clover, Nano Mo..

تأثير الرش الورقي لدقائق المولبيديوم النانوية ولسماد الفوسفاتي على انتاج المواد الفعالة طبيا على نبات البرسيم الاصفر

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وزارة التربية ، مدرسة الرحمن- العراق

الخلاصة

اجريت هذه التجربة الحقلية في الموسم الصيفي للعامين 2021-2020 و 2022-2021 وبتربة طينية رملية في محافظة الديوانية. صممت التجربة بالقطاعات العشوائية الكاملة (RCBD) وبثلاث مكررات بتنظيم القطع المنشقة وعند مستوي احتمال 0.05 شملت التسميد الفوسفاتي 0 و 20 كغم.ه⁻¹ (الوحدتان الرئيسيتان وبداخل كل مجموعة اربع مستويات Mo التاتويه 0 , 10 , 20 , 30) ملغم.لتر⁻¹ , اخذت عينة من التربة قبل الزراعة لتحليلها لمعرفة خواصها الفيزيائية والكيميائية كما في جدول 1 . زرعت بذور البرسيم الاصفر بمعدل بذار 20 كغم/هكتار بتاريخ 4/1 وبعمر زراعة 1 اسم وبعد 7 أشهر من الزراعة اخذت العينات لاجراء القياسات اذ اظهرت النتائج التأثير المعنوي للعوامل وتداخلاتها اذ اعطت القيم التالية على التوالي (2.35 , 2.72

القيم على التوالي (0.02 , 0.02 , 16.19 , 4.92 , 2.38 0.85 , 1.12) ونواتجه من تداخل مستوى السماد الفوسفاتي 0 كغم. ه⁻¹ والمستوي 0 ملغم. لتر⁻¹ دقائق الموليبيديوم. الكلمات المفتاحية: الرش الورقي, البرسيم الاصفر , الموليبيديوم النانوية

Introduction

Melilot one of main sources of Forage legume of animals diet in intercropping system. also, one of the medicinal plants [1,2] also Bio remediation because ability to remove heavy metals like Cadmium from soil. [3] also main sources of allelopathic which used in biological control [4]. Melilot had been represent adapted legume herb to drought and cold [5] treatment of Mung bean by 25 kg. ha⁻¹ phosphor increased seed yield to (1.5 t. ha⁻¹) and Stover yield (2.47 t ha⁻¹) [6] while the minimum value (1.11 t.ha⁻¹)and Stover yield 2.06 t, ha⁻¹) in 6 leaves stage treatment of Solanum tuberosum L. with 0.0125....0.025 M of Molybdenum Nanoparticles(Mo NPs) are ineffective in growth compare of same concentration of Iron and Copper nanoparticles which enhance growth of some plant [7] Foliar spray 20 ppm MoNPs in enhance growth and yield of Green bean [8]. Foliar spray of Mo Nanoparticles on 6 leaf stage of Mung bean increased growth traits[9] This study aimed to learn Effects of foliar spray of Mo NPs and phosphor fertilizer on production Medical active substances in yellow sweet clover

Material and methods

Seeds of Yellow clover inoculated with *Rhizobium meliloti* L.by imbibition seeds with the Rhizobium solution[10] *Rhizobium* culture's prepare from crushed sterile old root nodule with one drop of distal water then incubated at 0°C for 3-7 days [11] So as to stimulate bio fertilizers also all treatments fertilized with 20 kg.ha⁻¹ Urea (47%N)to stimulate *nif* H gene it responsible on nitrogenase formation [12] Add 10ml of methanol(100%) on seeds powder and mixing at 10min.Then store at 6h in dark place then faltered 4.5μ and Iam add 1ml hexane(100%) then analysis by GC-Mass.. Analysis of fats by dissolved 10 g of dry leaves powder with 10 ml Hexane 100%and inter to Soxhlet. While analysis of carbohydrates depend on [13] other measures [14].

Table(1) showed analysis of soil before planting		
Soil		
Value	Unite	Properties
7.42	-----	Soil PH
7.53		Water PH
14.5	(μS/cm)	Electrical conductivity
4.26	g.kg ⁻¹ of soil	Organic matter
73.21	mg.kg ⁻¹ of soi	A voluble nitrogen
41.75		A voluble phosphor
43		A voluble potassium
265	g.kg ⁻¹ of soi	Sand
175.4		Silt
752.8		Clay
	Sandy – clay soil	Texture

Results and Discussion

1. Leaves Protein percent %:

Table (2) showed significant effect of 20 kg .ha⁻¹ phosphor fertilizer on protein percent% max value(17.58%) of Yellow clover because increased activity in this optimum level of phosphor in soil which enhance root nodules which responsible on nitrogen fixation and photosynthesis and photorespiration and other essential processes this results in line with [15] also showed significant effect of Nano Mo NPs fertilizers on protein percent of Yellow clover max value(17.37%) in treatment 30 mg.l⁻¹because of increased Nano element passed through plasma membrane it is very small size and increased activity of nitrogenase in roots nodules and photosynthesis and photorespiration and other essential processes [8]this is conformity with[16] when MoNPs as cofactor to nitrate reductase and nitrification enzymes which responsible on fixation inorganic nitrate and stimulated nodulation and biological nitrogen fixation [17] also MoNPs which represent co-factor to enzymes of protein synthesis. also showed significant effect of interaction of Nano MoNPs and phosphor fertilizer max value (17.89%) in 20 kg.ha⁻¹ phosphor and 30 mg.l⁻¹ MoNPs because of roles of MoNPs as stimulator to protein synthesis enzymes and nitrogenase enzyme this accepted with[18] the differences between years depend on wind speed which increased soil plant atmospheric continuous and increased up take of elements and stem diameter. This accepted with [19].

Table (2) effect of p fertilizer and MoNPs on leaves protein% in Yellow clover at 2020-2021					
Average Phosphor fertilizer effects	Levels of Mo NPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
17.09	17.42	17.16	17.11	16.69	P 20 kg .ha-1
16.12	16.43	16.18	16.2	15.7	P 0 kg.ha-1
LSD a = 0.49	16.92	16.67	16.65	16.19	Average of Mo NPs effect
	LSD a*b= 0.45				LSD b= 0.3
effect of p fertilizer and Mo NPs on leaves protein % in Yellow clover at 2021-2022					
Average Phosphor fertilizer effect	Levels of Mo NPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
17.58	17.89	17.62	17.6	17.19	P 20 kg .ha-1
16.51	16.84	16.51	16.62	16.05	P 0 kg.ha-1
LSD a= 0.13	17.37	17.07	17.11	16.62	Average of Mo NPs effect
	LSD a*b= 0.43				LSD b= 0.34

2. Leaves Carbohydrates percent %

Table(3)showed significant effect of 20 kg .ha⁻¹ phosphor fertilizer on Carbohydrates percent% max value(5.57%) of Yellow clover because increased activity in this optimum level of phosphor in soil which enhance root nodules which responsible on nitrogen fixation and photosynthesis and photorespiration and other essential processes this results in line with [15] also showed significant effect of Nano Mo NPs fertilizers on Carbohydrates percent of Yellow clover max value(5.5%) in treatment 30 mg.l⁻¹because of increased Nano element passed through plasma membrane it is very small size and increased activity of nitrogenase in roots nodules and photosynthesis and photorespiration and other essential processes [8]this is conformity with[16] when MoNPs as cofactor to nitrate reductase and nitrification enzymes which responsible on fixation inorganic nitrate and stimulated nodulation and biological nitrogen fixation [17] also MoNPs which represent co-factor to enzymes of carbohydrates synthesis. also showed significant

effect of interaction of Nano MoNPs and phosphor fertilizer max value (5.69%) in 20 kg.ha⁻¹ phosphor and 30 mg.l⁻¹ MoNPs because of roles of MoNPs as stimulator to carbohydrates synthesis enzymes and nitrogenase enzyme this accepted with [18] the differences between years depend on wind speed which increased soil plant atmospheric continuous and increased up take of elements and stem diameter. This accepted with [19]

Table (3) effect of p fertilizer and MoNPs on Carbohydrates of Yellow clover at 2020-2021					
Average Phosphor fertilizer effects	Levels of Mo NPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
5.18	5.28	5.2	5.13	5.12	P 20 kg .ha ⁻¹
4.86	4.96	4.87	4.88	4.72	P 0 kg.ha ⁻¹
LSD a = 0.14	5.12	5.04	5.01	4.92	Average of Mo NPs effect
	LSD a*b= 0.13				LSD b= 0.09
effect of p fertilizer and Mo NPs on leaves Carbohydrates % in Yellow clover at 2021-2022					
Average Phosphor fertilizer effect	Levels of Mo NPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
5.57	5.69	5.67	5.45	5.49	P 20 kg .ha ⁻¹
5.13	5.31	5.23	5.15	4.84	P 0 kg.ha ⁻¹
LSD a= 0.25	5.5	5.45	5.3	5.16	Average of Mo NPs effect
	LSD a*b= 0.23				LSD b= 0,15

3. Leaves Fats percent %

Table(4) showed significant effect of 20 kg .ha⁻¹ phosphor fertilizer on Fats percent% max value(0.93%) of Yellow clover because increased activity in this optimum level of phosphor in soil which enhance root nodules which responsible on nitrogen fixation and photosynthesis and photorespiration and other essential processes this results in line with [15] also showed significant effect of Nano Mo NPs fertilizers on Fats percent of Yellow clover max value(0.91%) in treatment 30 mg.l⁻¹ because of increased Nano element passed through plasma membrane it is very small size and increased activity of nitrogenase in roots nodules and photosynthesis and photorespiration and other essential processes [8]this is conformity with [16] when MoNPs as cofactor to nitrate reductase and nitrification enzymes which responsible on fixation inorganic nitrate and stimulated nodulation and biological nitrogen fixation [17] also MoNPs which represent co-factor to enzymes of Fats synthesis. also showed significant effect of interaction of Nano MoNPs and phosphor fertilizer max value(0.99%) in 20 kg.ha⁻¹ phosphor and 30 mg.l⁻¹ MoNPs because of roles of MoNPs as stimulator to Fats synthesis enzymes and nitrogenase enzyme this accepted with [18] the differences between years depend on wind speed which increased soil plant atmospheric continuous and increased up take of elements and stem diameter. This accepted with [19].

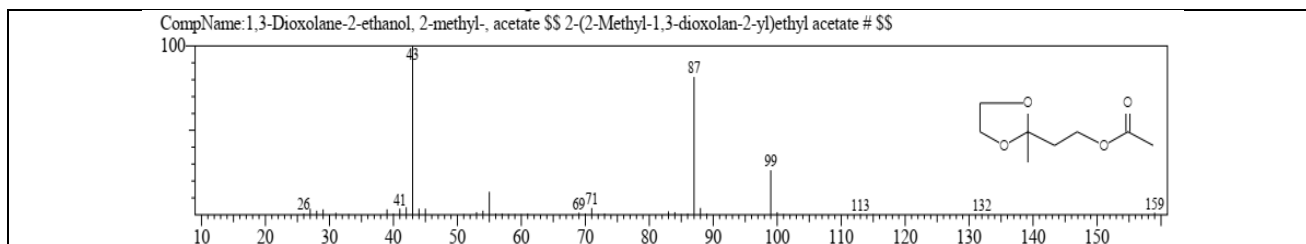
4. Dioxolane

Table(5) showed significant effect of 20 kg .ha⁻¹ phosphor fertilizer on Dioxolane max value(2.02) of Yellow clover because increased activity in this optimum level of phosphor in soil which enhance root nodules which responsible on nitrogen fixation and roots nodules represented precursor to all active substances enzymes depend on type of organic acids come from Krebs cycles and photosynthesis and photorespiration and other essential processes this results in line with [15]

Table (4) effect of phosphor fertilizer and MoNPs on Fats % in Yellow clover at 2020-2021					
Average Phosphor fertilizer effects	Levels of MoNPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
0.93	0.95	0.93	0.92	0.92	P 20 kg .ha ⁻¹
0.87	0.89	0.87	0.85	0.87	P 0 kg.ha ⁻¹
LSD a = 0.006	0.92	0.9	0.89	0.89	Average of MoNPs effect
	LSD a*b= 0.02				LSD b= 0.02
effect of Phosphor fertilizer and MoNPs on Fats % in Yellow clover at 2021-2022					
Average Phosphor fertilizer effect	Levels of S Nanoparticles mg.l-1				Phosphor fertilizer
	30	20	10	0	
0.93	0.99	0.94	0.87	0.9	P 20 kg .ha ⁻¹
0.83	0.84	0.83	0.88	0.8	P 0 kg.ha ⁻¹
LSD a= 0.12	0.91	0.88	0.87	0.85	Average of S Nanoparticles effect
	LSD a*b= 0.1				LSD b= 0.06

also showed significant effect of Nano Mo NPs fertilizers on Dioxolane of Yellow clover max value(2.67) in treatment 30 mg.l⁻¹ because of increased Nano element passed through plasma membrane it is very small size and increased activity of nitrogenase in roots nodules and photosynthesis and photorespiration and other essential processes [8]this is conformity with[16] when MoNPs as cofactor to nitrate reductase and nitrification enzymes which responsible on fixation inorganic nitrate and stimulated nodulation and biological nitrogen fixation [17] also MoNPs which represent co-factor to enzymes of active substances synthesis. also showed significant effect of interaction of Nano MoNPs and phosphor fertilizer max value (2.72) in 20 kg.ha⁻¹ phosphor and 30 mg.l⁻¹ MoNPs because of roles of MoNPs as stimulator to active substances synthesis enzymes and nitrogenase enzyme this accepted with[18] the differences between years depend on wind speed which increased soil plant atmospheric continuous and increased up take of elements and stem diameter. This accepted with [19].

Table (5) effect of p fertilizer and MoNPs on Dioxolane in Yellow clover at 2020-2021					
Average Phosphor fertilizer effects	Levels of MoNPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
1.87	2.52	2.48	2.48	0.02	P 20 kg .ha ⁻¹
1.79	2.4	2.39	2.35	0.02	P 0 kg.ha ⁻¹
LSD a = 0.01	2.46	2.44	2.41	0.02	Average of MoNPs
	LSD a*b= 0.04				LSD b= 0.03
effect of Phosphor fertilizer and MoNPs on Dioxolane in Yellow clover at 2021-2022					
Average Phosphor fertilizer effect	Levels of MoNPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
2.02	2.72	2.67	2.67	0.02	P 20 kg .ha ⁻¹
1.88	2.62	2.5	2.37	0.02	P 0 kg.ha ⁻¹
LSD a= 0.07	2.67	2.58	2.52	0.02	Average of MoNPs
	LSD a*b= 0.15				LSD b= 0.12



5. Ethylamine:

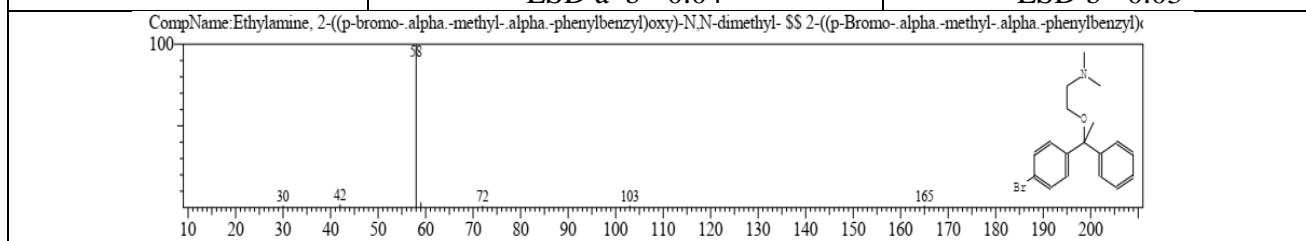
Table(6) showed significant effect of 20 kg .ha⁻¹ phosphor fertilizer on Ethylamine max value(1.75) of Yellow clover because increased activity in this optimum level of phosphor in soil which enhance root nodules which responsible on nitrogen fixation and precursor to all active substances enzymes depend on type of organic acids come from Krebs cycles and photosynthesis and photorespiration and other essential processes this results in line with [15] also showed significant effect of Nano Mo NPs fertilizers on Ethylamine of Yellow clover max value(2.3) in treatment 30 mg.l⁻¹ because of increased Nano element passed through plasma membrane it is very small size and increased activity of nitrogenase in roots nodules and photosynthesis and photorespiration and other essential processes [8]this is conformity with[16] when MoNPs as cofactor to nitrate reductase and nitrification enzymes which responsible on fixation inorganic nitrate and stimulated nodulation and biological nitrogen fixation [17] also MoNPs which represent co-factor to enzymes of Ethylamine synthesis. also showed significant effect of interaction of Nano MoNPs and phosphor fertilizer max value(2.35) in 20 kg.ha⁻¹ phosphor and 30 mg.l⁻¹ MoNPs because of roles of MoNPs as stimulator to Ethylamine synthesis enzymes and nitrogenase enzyme this accepted with[18] the differences between years depend on wind speed which increased soil plant atmospheric continuous and increased up take of elements and stem diameter. This accepted with [19].

Table (6) effect of p fertilizer and MoNPs on Ethylamine in Yellow clover at 2020-2021

Average Phosphor fertilizer effects	Levels of MoNPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
1.46	1.96	1.93	1.92	0.02	P 20 kg .ha ⁻¹
1.4	1.88	2.76	2.69	0.02	P 0 kg.ha ⁻¹
LSD a = 0.01	1.92	1.85	1.84	0.02	Average of MoNPs effect
	LSD a*b= 0.018				LSD b= 0.021

effect of Phosphor fertilizer and MoNPs on Ethylamine in Yellow clover at 2021-2022

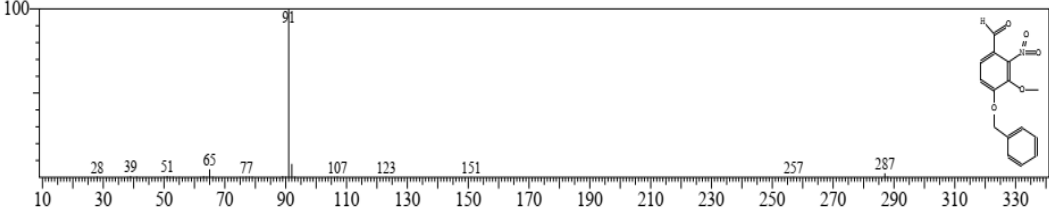
Average Phosphor fertilizer effect	Levels of MoNPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
1.75	2.35	2.31	2.31	0.02	P 20 kg .ha ⁻¹
1.68	2.26	2.23	2.22	0.02	P 0 kg.ha ⁻¹
LSD a= 0.003	2.3	2.27	2.27	0.02	Average of MoNPs effect
	LSD a*b= 0.04				LSD b= 0.03



6. Benzaldehyde

Table(7) showed significant effect of 20 kg .ha⁻¹ phosphor fertilizer on Benzaldehyde max value(2.28) of Yellow clover because increased activity in this optimum level of phosphor in soil which enhance root nodules which responsible on nitrogen fixation and precursor to all active substances enzymes depend on type of organic acids come from Krebs cycles and photosynthesis and photorespiration and other essential processes this results in line with [15] also showed significant effect of Nano Mo NPs fertilizers on Benzaldehyde of Yellow clover max value(3.2) in treatment 30 mg.l⁻¹ because of increased Nano element passed through plasma membrane it is very small size and increased activity of nitrogenase in roots nodules and photosynthesis and photorespiration and other essential processes [8]this is conformity with[16] when MoNPs as cofactor to nitrate reductase and nitrification enzymes which responsible on fixation inorganic nitrate and stimulated nodulation and biological nitrogen fixation [17] also MoNPs which represent co-factor to enzymes of Benzaldehyde synthesis. also showed significant effect of interaction of Nano MoNPs and phosphor fertilizer max value(3.08) in 20 kg.ha⁻¹ phosphor and 30 mg.l⁻¹ MoNPs because of roles of MoNPs as stimulator to Benzaldehyde synthesis enzymes and nitrogenase enzyme this accepted with[18] the differences between years depend on wind speed which increased soil plant atmospheric continuous and increased up take of elements and stem diameter. This accepted with[19]

Table (7) effect of p fertilizer and MoNPs on Benzaldehyde in Yellow clover at 2020-2021

Average Phosphor fertilizer effects	Levels of MoNPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
1.47	1.98	1.95	1.95	0.02	P 20 kg .ha ⁻¹
1.41	1.9	1.87	1.86	0.02	P 0 kg.ha ⁻¹
LSD a = 0.003	1.94	1.91	1.9	0.02	Average of MoNPs
	LSD a*b= 0.03				LSD b= 0.03
effect of Phosphor fertilizer and MoNPs on Benzaldehyde in Yellow clover at 2021-2022					
Average Phosphor fertilizer effect	Levels of MoNPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
2.28	3.08	3.03	2.99	0.02	P 20 kg .ha ⁻¹
2.18	2.96	2.87	2.87	0.02	P 0 kg.ha ⁻¹
LSD a= 0.05	3.2	2.95	2.93	0.02	Average of MoNPs
	LSD a*b= 0.06				LSD b= 0.04
CompName: Benzaldehyde, 4-benzyloxy-3-methoxy-2-nitro- SS 4-(Benzyloxy)-3-methoxy-2-nitrobenzaldehyde # SS 					

7. Total Chlorophyll :

Table(8) showed significant effect of 20 kg .ha⁻¹ phosphor fertilizer on total chlorophyll percent% max value(2.81) of Yellow clover because increased activity in this optimum level of phosphor in soil which enhance root nodules which responsible on nitrogen fixation and photosynthesis and photorespiration and other essential processes this results in line with [15] also

showed significant effect of Nano Mo NPs fertilizers on total chlorophyll of Yellow clover max value(2.78) in treatment 30 mg.l⁻¹ because of increased Nano element passed through plasma membrane it is very small size and increased activity of nitrogenase in roots nodules and photosynthesis and photorespiration and other essential processes [8]this is conformity with[16] when MoNPs as cofactor to nitrate reductase and nitrification enzymes which responsible on fixation inorganic nitrate and stimulated nodulation and biological nitrogen fixation [17] also MoNPs which represent co-factor to enzymes of total chlorophyll synthesis. also showed significant effect of interaction of Nano MoNPs and phosphor fertilizer max value(2.88) in 20 kg.ha⁻¹ phosphor and 30 mg.l⁻¹ MoNPs because of roles of MoNPs as stimulator to nitrogenase enzyme this accepted with[18] the differences between years depend on wind speed which increased soil plant atmospheric continuous and increased up take of elements and stem diameter. This accepted with [19].

Table (8) effect of phosphor fertilizer and MoNPs on total chlorophyll mg. 2g⁻¹ leaves fresh weight in Yellow clover at 2020-2021					
Average Phosphor fertilizer effects	Levels of MoNPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
2.66	2.74	2.67	2.61	2.64	P 20 kg .ha ⁻¹
2.47	2.55	2.47	2.48	2.38	P 0 kg.ha ⁻¹
LSD a = 0.1	2.64	2.57	2.55	2.51	Average of MoNPs effect
	LSD a*b= 0.09				LSD b= 0.06
effect of Phosphor fertilizer and MoNPs on total chlorophyll mg. 2g ⁻¹ leaves fresh weight in Yellow clover at 2021-2022					
Average Phosphor fertilizer effect	Levels of MoNPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
2.81	2.88	2.82	2.78	2.78	P 20 kg .ha ⁻¹
2.6	2.68	2.64	2.65	2.45	P 0 kg.ha ⁻¹
LSD a= 0.07	2.78	2.73	2.71	2.62	Average of MoNPs effect
	LSD a*b= 0.04				LSD b= 0.02

8. Forage yield(Ton. ha-1):

Table(9) showed significant effect of 20 kg .ha-1 phosphor fertilizer on Forage yield max value(1.68) of Yellow clover because increased activity in this optimum level of phosphor in soil which enhance root nodules which responsible on nitrogen fixation and photosynthesis and photorespiration and other essential processes this results in line with [15] also showed significant effect of Nano Mo NPs fertilizers on Forage yield of Yellow clover max value(1.66) in treatment 30 mg.l⁻¹ because of increased Nano element passed through plasma membrane it is very small size and increased activity of nitrogenase in roots nodules and photosynthesis and photorespiration and other essential processes [8]this is conformity with [16] when MoNPs as cofactor to nitrate reductase and nitrification enzymes which responsible on fixation inorganic nitrate and stimulated nodulation and biological nitrogen fixation [17] also MoNPs which represent co-factor to enzymes of Forage yield. also showed significant effect of interaction of Nano MoNPs and phosphor fertilizer max value(1.71) in 20 kg.ha⁻¹ phosphor and 30 mg.l⁻¹ MoNPs because of roles of MoNPs as stimulator to Forage yield synthesis enzymes and nitrogenase enzyme this accepted with[18] the differences between years depend on wind speed which increased soil plant

atmospheric continuous and increased up take of elements and stem diameter. This accepted with [19].

Table (9) effect of phosphor fertilizer and MoNPs on Forage yield(Ton ha⁻¹) in Yellow clover at 2020-2021

Average Phosphor fertilizer effects	Levels of MoNPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
1.370	1.440	1.413	1.336	1.290	P 20 kg .ha ⁻¹
1.183	1.233	1.220	1.153	1.126	P 0 kg.ha ⁻¹
LSD a = 0.025	1.336	1.316	1.245	1.208	Average of MoNPs effect
	LSD a*b= 0.033				LSD b= 0.025

effect of Phosphor fertilizer and MoNPs on Forage yield(Ton ha⁻¹) in Yellow clover at 2021-2022

Average Phosphor fertilizer effect	Levels of MoNPs mg.l ⁻¹				Phosphor fertilizer
	30	20	10	0	
1.68	1.71	1.68	1.68	1.65	P 20 kg .ha ⁻¹
1.58	1.62	1.59	1.56	1.57	P 0 kg.ha ⁻¹
LSD a= 0.062	1.66	1.64	1.62	1.61	Average of MoNPs effect
	LSD a*b= 0.054				LSD b= 0.035

Conclusion

The study concludes that all factors and interactions were significant effect and produce three medical active substances Dioxolane ,Ethylamine , Benzaldehyde and protein , carbohydrates ,Fats , total chlorophyll , forage yield and their max values respectively in interaction 20 kg.ha⁻¹ and 30 mg.l⁻¹ while the min values respectively (0.02 , 0.02 , 0.02 , (16.19 , 4.92 , 0.85)% , 2.38 mg.2g⁻¹ and 1.12 T.ha⁻¹) in the interaction of 0 kg.ha⁻¹ and 0 mg. l⁻¹ MoNPs t.

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