University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

Performance evaluation of the developed combined lines seeder through the forward speeds and seeding rates of the barley *Hordeum vulgare* L.

[1] Ali J. Shannon [2] Marwan N. Ramadhan [3] Majed S. Himoud

[1,2,3] Department of Agricultural Machinery and Equipment, College of Agriculture, University of Basrah, Basrah, Iraq.

[1]*E-mail: pgs.ali.jabary@uobasrah.edu.iq*
[2]*E-mail: marwan.ramadhan@uobasrah.edu.iq*
[3]*E-mail: majed.himoud@uobasrah.edu.iq*

Abstract

The field experiment was conducted in one of the fields of Maysan Governorate / Al-Batira region in a silty clay soil during the 2023 winter season, with the aim of developing and evaluating the efficiency of the performance of a combined and advanced machine used for planting on lines with equal distances and appropriate depths, with covering the seeds and appropriate disintegration of the soil using spring needles, fertilizing at the same time, and opening the furrows. Using separators after attaching them to the seeder.

The experiment was carried out using two machine configurations: the seeder alone (B) and the seeder with the furrow opener (BZ), which is equivalent to basin irrigation system and furrows, and two tractor speeds (s1, s2) (4 and 6 km/h), with the aim of knowing its effect on (moisture content and field efficiency). The same two formulations and speeds above were also used with three barley seed rates (T1, T2, T3) kg/dunum in order to determine their effect on (plant height and grain yield). The (W2) composition gave a decrease in field efficiency, as it was recorded (86.338%). The (W2) composition gave a decrease in moisture content (15,203%), plant height (109.47) cm, and grain yield (3,523) tons/ha. The (W1) composition gave the highest average of field efficiency, reaching (88.805%). The composition (W1) resulted in a decrease in average plant height, reaching 113.36 cm, moisture content (22,648%), and grain yield (4,028) tons/ha. The third seed rate (T3) gave the highest average of grain yield, reaching (4,168) tons/ha, and plant height (113.58) cm. The second speed (S2) gave the highest average of field efficiency (88,643%), moisture content (19,173%), plant height (110,778) cm, and grain yield (3,774) tons/ha. The interaction treatment (w1t3) recorded the highest plant height. The interaction treatment (s1t3) recorded the highest grain yield, reaching 4,317 kg/ha.

Keywords: barley yield, forward speed, furrow opener, Irrigation, seed rates.

Introduction

The productivity of agricultural crops is affected by several factors, including: planting date, soil preparation before planting, soil fertility, and the efficiency of the mechanical farming process.

Manual farming still occupies a large space in the field of agriculture despite the availability of many agricultural equipment. The reason for this may be due to the adoption of the manual method due to the area of the holding, the method of exploiting the land and the material capabilities of the farmer using modern methods. Automated methods have become a scientific and practical fact that has a direct impact on raising and improving the quality and quantity of production. Seeders also place seeds in the soil to the required depth, and distribute them in the field in a specific system or arrangement.

The most important feature of a seeder is the precise cultivation of placing a single seed, at equal distances between one seed and another, and at an equal depth in the soil to produce a single plant, so that it is not permissible to leave a place without a seed, and it is not permissible to place more than one seed in one place, and the purpose of this method is to reduce the amount of seeds needed for planting, reduce crowding between plants, especially in the first stages of growth, distribute nutrients regularly to the plants, reduce the cost of plant thinning, and achieve high productivity. Agricultural mechanization

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

performs various agricultural operations using mechanical equipment that relies on mechanical or electrical driving power, using minimal human or animal effort. There are many combined machines designed to develop plowing, and most of these machines are used for primary and secondary plowing, crop service equipment, weed control, seeding, and fertilization. This equipment has become commonly used because it works with more than one operation during its passage at the same time, in addition to reducing the number of passes in the field (1), as the use of seeding machines gave positive results in the speed of completion of the seeding process and the lack of waste in the quantities of seed used, as the reason for the lack of irrigation water supplies resulting from climate change and the misuse of the water distribution process in the correct manner has forced many farmers in Iraq to abandon agriculture, Some farmers used groundwater to irrigate crops. They used alternative methods, represented by the use of furrow irrigation, which leads to further expansion of horizontal agriculture of the same water resource. Thus, an increase in the efficiency of water use can be achieved, which leads to securing food and reducing the risks of desertification. Barley, *Hordeum vulgare* L., is one of the first cereal crops to be grown, and its use dates back to stone times. Barley is characterized by its rapid growth and its ability to tolerate salinity and drought, so most areas of Iraq are suitable for its cultivation. The research aims to choosing the optimal speed for cultivation, the appropriate amount of seed, the best irrigation method (basin and furrows) and Study the performance efficiency of the combined machine.

I. Materials and Methods

Field of experience:

The field experiment was conducted in one of the fields of Maysan Governorate / Al-Batira region, which is about 20 km west of the city of Amara, during the 2023 winter season, with the aim of developing and evaluating the efficiency of the performance of a combined and developed machine used for planting on lines with equal distances and appropriate depths, with covering seeds and appropriate disintegration of the soil using spring needles, and fertilizing in the same time and opening furrows by the furrow opener after attaching it to the seeder.

The land was plowed with a moldboard plow, then smoothed and leveled using a leveler after the initial plowing. Several soil samples of the experimental field were taken randomly from different locations to suit the field conditions and at depths of (0-10) and (10-20) cm. The soil properties of the experimental field were measured in a laboratory and the results are shown in Table (1) **.**

Table (1) The size distribution of soil particles and their characteristics

	Value	Unit
Sand	322.10	g/kg
Silt	290.50	g/kg
Clay	387.40	g/kg
Soil texture	Silty clay	
Bulk density	1.58	g/cm^3
Porosity	39.69	%
PH	7.28	
EC	3.86	dS/m

Barley crop (a local variety) obtained from the Seed Certification and Production Directorate in Maysan Governorate.

The experiment was carried out using two machine configurations: the seeder alone (B) and the seeder with the furrow opener (BZ), which is equivalent to the basin irrigation and the Furrows, and two tractor speeds (S1, S2) (4 and 6) km/h, respectively .

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

In order to know its effect on field efficiency and moisture content. The same two combinations and speeds above were also used with three seed rates (T1, T2, T3) (25, 30, 35 kg/dunum) respectively, in order to determine their effect on plant height and grain yield.

Three replications and a factorial experiment with a randomized complete block design (RCBD) were used in the experiment. There were split-plot arrangements for plant height and barley yield, as well as split-plot arrangements for field efficiency and soil moisture content.

Combined seeder:

After manufacturing and assembling the furrow openers and connecting them to the Italian GASPARDO seeder, a test was conducted on them by connecting them to the tractor. They were used in previously plowed, smoothed, and leveled soil. The furrows were opened to a depth of 22 cm to irrigate the barley crop. As for the process of dropping the seeds, it was done through seed drop tubes. Seeder opener opens the soil on both sides of the drill using its pointed edge, and has the ability to move horizontally and vertically and for different distances with a change in the width and depth of the furrow.

After completing the land preparation operations, the seeding operations began, but after making adjustments and arrangements for the seed used in terms of the quantity of seed, the depth of planting, and the uniformity and distribution of the seeds within one line, the seed was organized according to what was stated in the catalog attached to the seeder, and to ensure the accuracy of the results, this was laboratory tested, as stated in (2).

Characteristics measured in the experiment:

1- Field efficiency (%):-

Field efficiency was calculated using the following equation No. (1) / (3):

$$\%F.E = A.F.C / T.F.C \times 100 \ldots\ldots\ldots\ldots (1)$$

whereas :

F.E: Field efficiency (%)

A.F.C: Actual field productivity (ha/hour)
T.F.C: Theoretical field productivity (ha/hour)

2-Soil moisture content (Pw):

The moisture content of the soil was measured by the gravimetric method by taking soil samples from the field using (core sampling), weighing them, and then drying them in the oven at a temperature of (105)°C until the weight was constant. The moisture content was calculated on the basis of dry weight from equation (2) according to method (4).).

$$Pw = (Mw / Ms) x100 \ldots\ldots.(2)$$

Since:

Pw = Percentage of soil moisture based on dry weight (%)

Mw = weight of moisture in the soil (g)

Ms = weight of dry solid particles (g)

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

3- Plant height (cm):

The average height of ten plants at random from each experimental unit was measured in units (cm) from the soil surface to the highest peak of the plant, excluding the stem, in an area of 1 m^2 at the end of the season.

- Total yield (ton/hectare):

The grain yield was calculated in units (kg/m^2) and then converted to a unit (ton/ha). The grain yield was estimated based on the grain weight of the plants harvested from an area of 1 m^2 of each experimental unit**.**

Statistical analysis:

The obtained data were collected and statistical analysis of the arithmetic averages was conducted using the statistical analysis program (Gen Stat). The averages of the treatments were tested using the least significant difference (LSD) test at a probability level of 0.05.

3- Results and discussion:

1- Field efficiency %:

1-1 The effect of the combination used on field efficiency:

The results of the statistical analysis show that there is a significant effect of the combination used on field efficiency, as combination (W1) recorded the highest value for field efficiency, reaching (88.8)%, while combination (W2) recorded the lowest value for field efficiency, reaching (86.33)%. The reason for this is due to stirring an amount of soil to open up the furrows and increase the difference between practical and theoretical productivity, which occurred as a result of tire slippage, led to an increase in the time required to complete the work per unit area and a decrease in field efficiency. This is consistent with the results of (6).

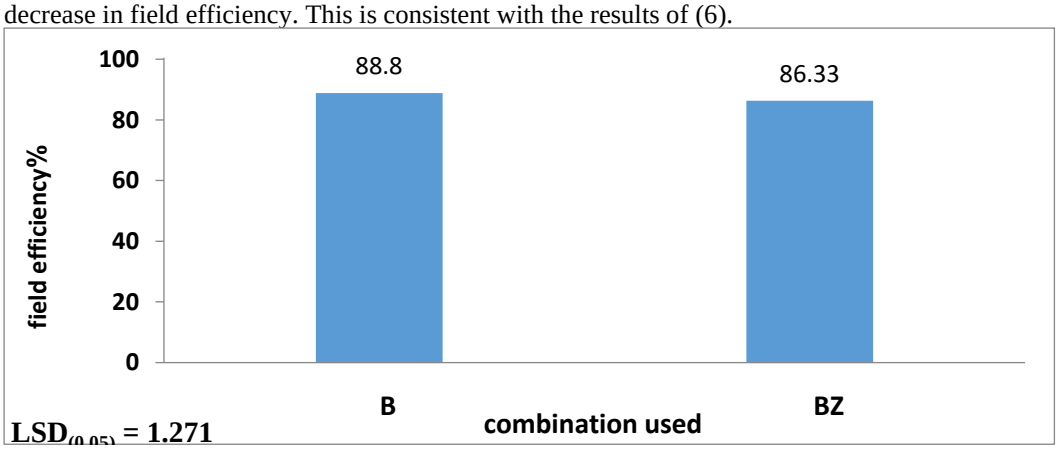

Figure (1) The effect of the combination used on field efficiency.

1-2 The effect of forward speed on field efficiency:

The results of the statistical analysis show that there is a significant effect of speed. Speed (S2) recorded the highest value for field efficiency, reaching (88.64)%, while speed (S1) recorded the lowest value for field efficiency, reaching (86.50)%. This is due to an increase in the time and speed utilization factor, which in turn, led to an increase in practical productivity, which is an important element in estimating field efficiency and is directly proportional to them, and this is

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

consistent with (7).

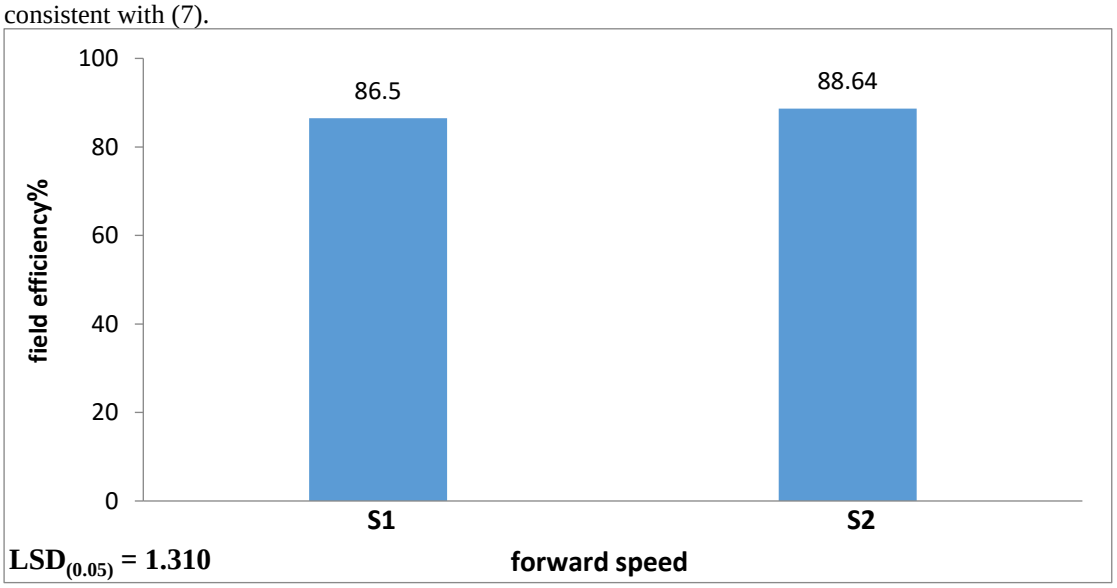

Figure (2) Effect of forward speed on field efficiency.

2-Moisture content:

2-1 Effect of the combination used on moisture content:

The results of the statistical analysis showed a significant effect of the combination used on the moisture content, as combination (W1) recorded the highest percentage of moisture content, reaching (22.64)%, while combination (W2) recorded the lowest percentage of moisture content, reaching (12.20)%, due to the amounts of water that it is accommodated by basin irrigation compared to furrow irrigation, as furrows have the ability to retain water, reduce evaporation, and cause an increase in crop branching at the end of the season and lower temperatures, and this is what agreed with (8).

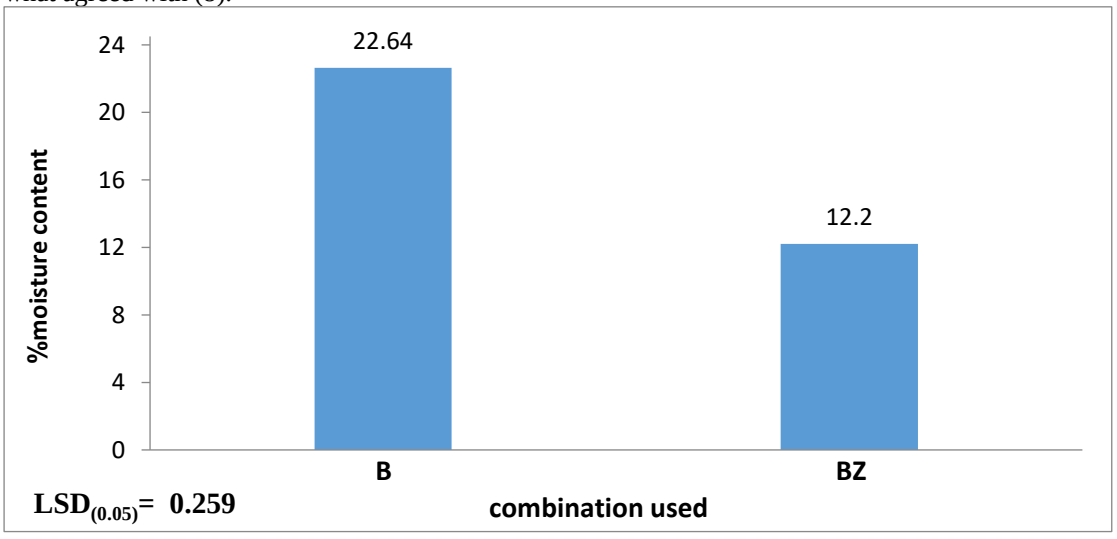

Figure (3) Effect of the combination used on moisture content

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

2-2 The effect of forward speed on moisture content:

The results of the analysis of variance shown in Table (4) showed that there are no significant differences between the average values of moisture content due to the effect of forward speed.

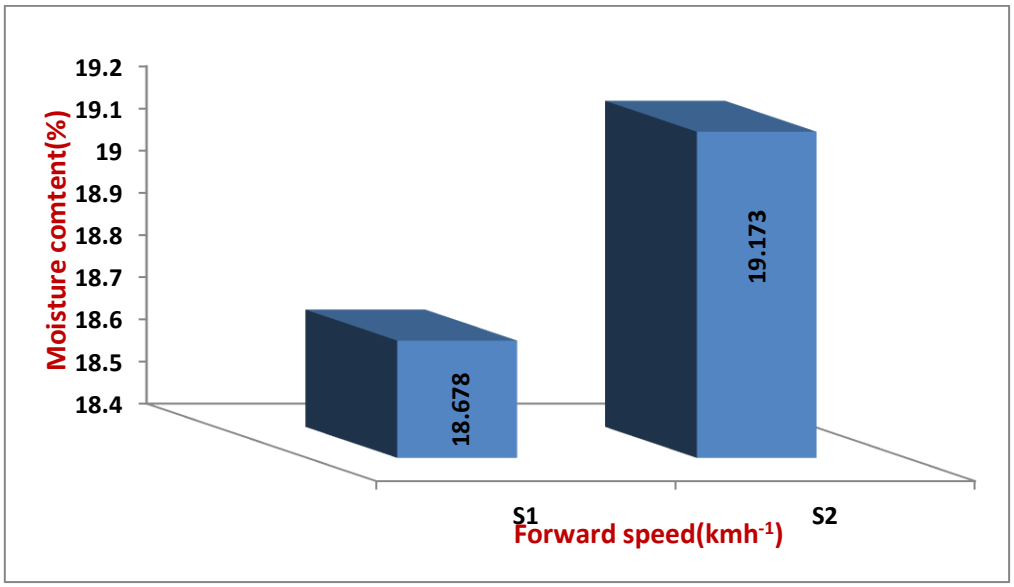

Figure (4)Effect of forward speed on moisture content

2-3Effect of the interaction between composition and forward velocity on moisture content:

notice through the table of results of the analysis of variance, there are no significant differences between the averages of moisture content as a result of the interaction between composition and forward speed.

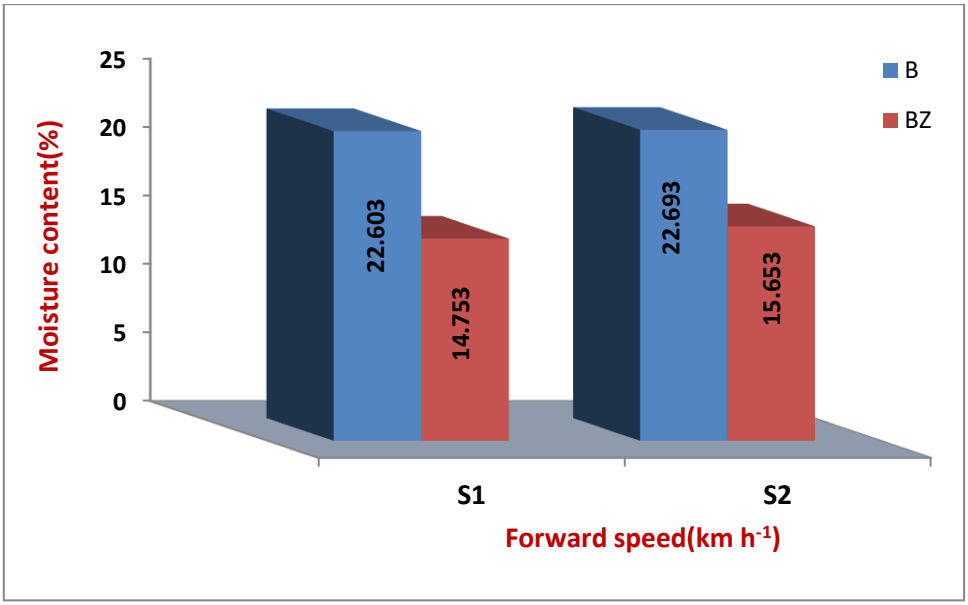

Figure (5)Effect of the interaction between composition and forward velocity on moisture content

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

3- Plant height:

3-1 The effect of the combination used on plant height:

The results of the statistical analysis showed that there was a significant effect of the combination used on the height of the plant, as the combination (w1) recorded the highest height of the plant, reaching (113.36) cm, while the combination (w2) recorded the lowest height of the plant, reaching (109.47) cm. Plant density increased due to shading and a decrease in light radiation, which led to pushing the plants upward due to the speed of division and an increase in the elongation of the plant to obtain light, and this is consistent with what was found (9).

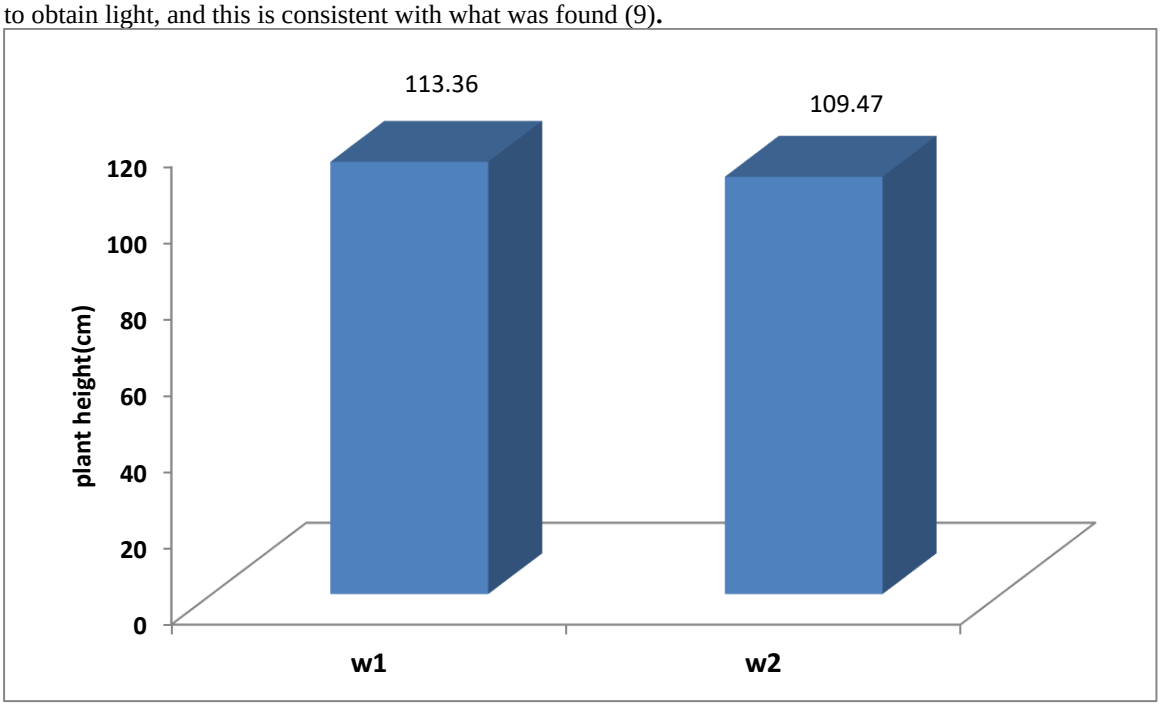

Figure (6) Effect of the combination used on plant height

3-2 The effect of forward speed on plant height:

The results of the statistical analysis showed that there was a significant effect of the forward speed on the plant height, as (S1) recorded the highest plant height, reaching (112.05) cm, while the second speed (S2) gave the lowest plant height, reaching (110.77) cm. The height of plants increased at the first speed due to the uniform depth of the seeds in the lines, their burial in a homogeneous manner, and the birds not attacking them as a result of not being exposed to the surface of the soil or being washed away by water or other factors, and this is what (10) found.

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

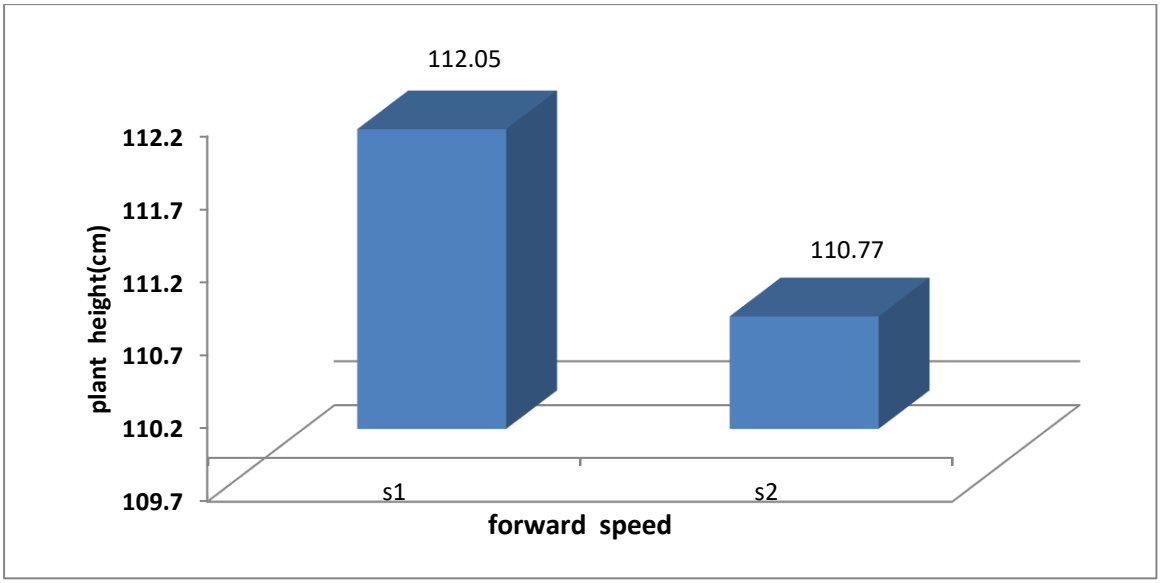

Figure (7) Effect of forward speed on plant height

3-3 The effect of seeding rate on plant height:

The results of the statistical analysis showed that there was a significant effect of the seed rate on plant height, as the seed rate (T3) recorded the highest plant height of 113.58 cm, while the seed rate (T1) recorded the lowest plant height of 110.77 cm. The reason for the increase in plant height as a result of the large number of seeds coming out of the feeding mechanism at the third rate and the increase in the number of plants per unit area, i.e. higher plant density, and this increase led to stimulating the stem cells to elongate and divide more quickly to obtain light, this is consistence with (11) findings**.**

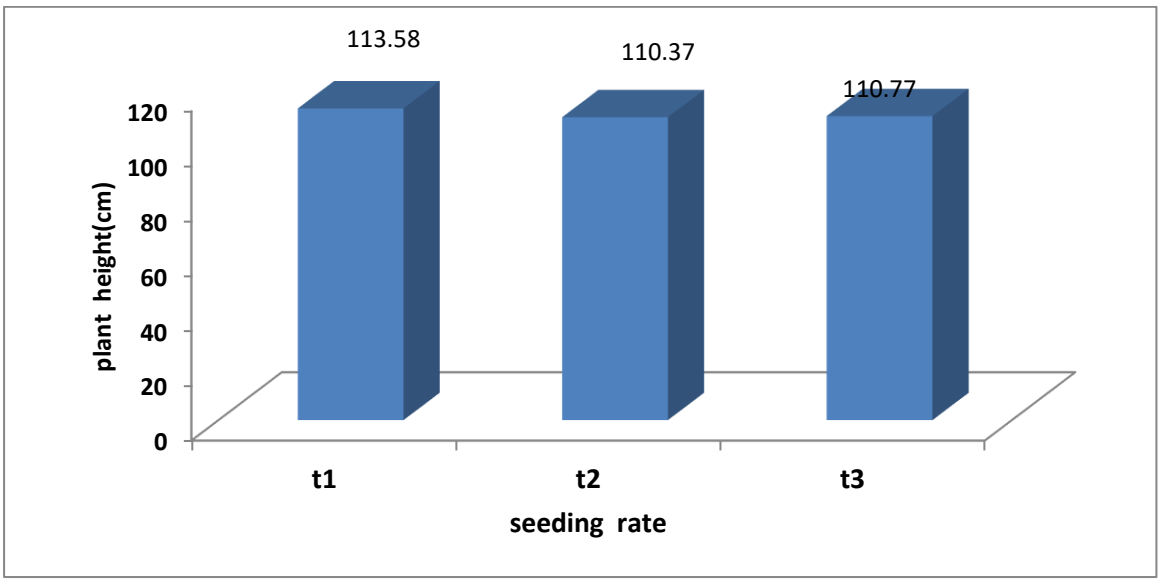

Figure (8) Effect of seeding rate on plant height

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

4-3 The effect of the interaction between the combination used and the seeding rate on plant height:

The results of the statistical analysis showed that there was a significant effect of the combination used and the seed rate on plant height, as the combination (w1T3) recorded the highest plant height, reaching (115,833) cm, while the combination (w2T2) recorded plant height reaching (107,500) cm.

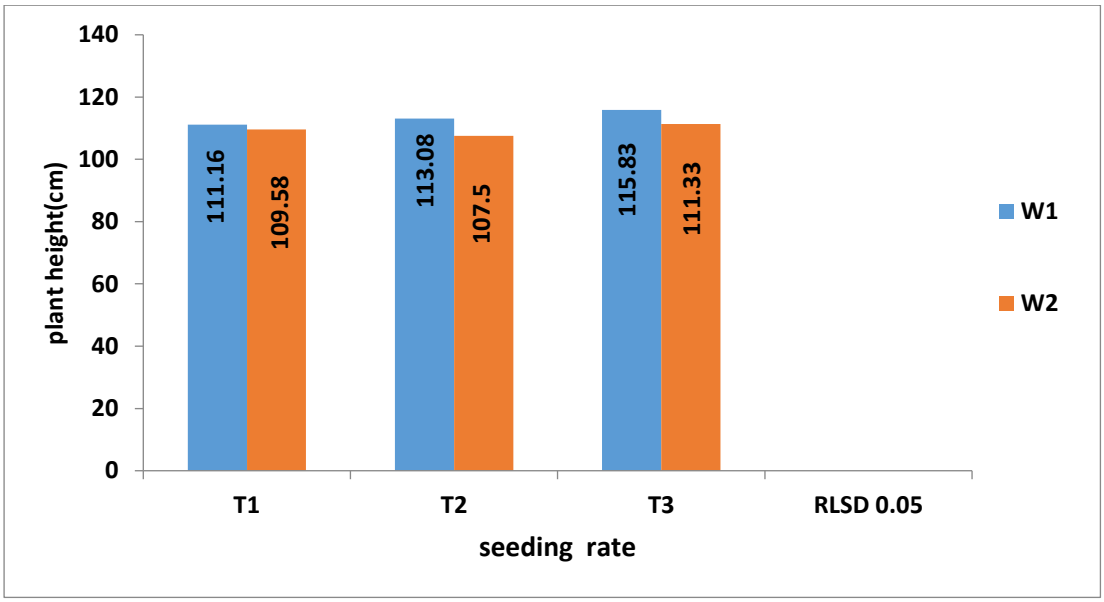

Figure (9) Effect of the interaction between the combination used and seeding rate on plant height

35-The effect of the interaction between the combination used, seed rate, and speed on plant height:

The results of the statistical analysis showed that there was a significant effect in the combination used and the seed rate on plant height, as the combination (w1T3S1) recorded the highest plant height of (117,333) cm, while the combination (w2T2S2) recorded the plant height of (106,333) cm.

Table (2) Effect of the combination used, forward speed, seeding rate, and overlap on plant height

		Speed			
Combination	Seeding rate	S1	S2	Combination and seeding rate interaction mean	Combination mean
W1	T1	112.333	110	111.167	113.361
	T2	113.167	113	113.083	
	T3	117.333	114.333	115.833	
W2	T1	109.167	110	109.583	109.472
	T2	108.667	106.333	107.5	
	T3	111.667	111	111.333	
	Combination and speed interaction mean				
	W1	114.278	112.444		
	W2	109.833	109.111		
	Seeding rate and speed interaction mean			Seeding rate mean	
	T1	110.75	110	110.375	
	T2	110.917	109.667	110.292	
	T3	114.5	112.667	113.583	
	Speed	112.056	110.778		

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

	Combination and speed	Seeding rate and speed	Combination and seeding rate	Combination	Speed	Seeding rate	Combination and Seeding rate and Speed
LSD	ns	ns		1.265	1.159	0.988	1.301

4- Grain yield:

4-1 The effect of the combination used on grain yield:

The results of the statistical analysis showed a significant effect of the combination used on grain yield, as the combination (w1) recorded the highest average yield of (4,028) kg/ha, while combination (w2) recorded the lowest yield of (3,523) kg/ha, as plant yield increased by increasing plant density, meaning a higher seed rate, is due to cultivating the land, spreading the seed in all its lines, and not canceling the feeding holes to drop the seeds when attaching the drills, meaning canceling a number of planting lines, and this agrees with what he found and concluded (12).

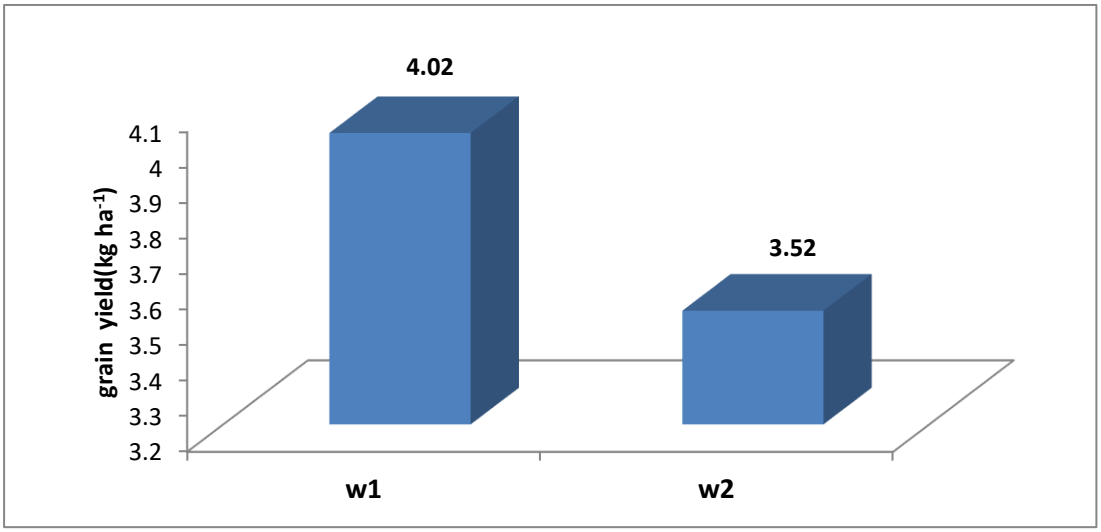

Figure (10) Effect of the combination used on grain yield

4-2 The effect of seeding rate on grain yield:

The results of the statistical analysis show that there is a significant effect for the seed rate on grain yield, as the seed rate (T3) recorded the highest average yield of 4,168 kg/ha, while the seed rate (T1) was the lowest reached 3,313 kg/ha. This is due to the fact that the number of seeds coming out of the feeding mechanism was the largest at the third rate, and this means an increase in the number of plants per unit area, which increased the plant density, and this increase led to the elongation of the stem to obtain light, and this helped to increase the efficiency of photosynthesis and thus increasing grain yield, and this is what was (13) found.

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

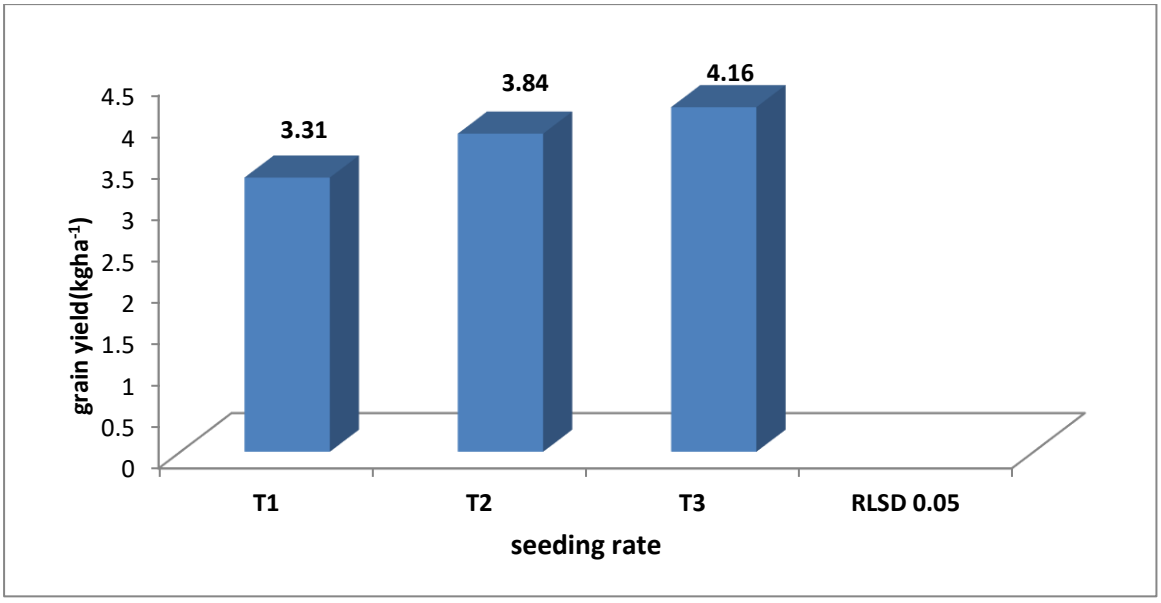

Figure (11) Effect of seeding rate on grain yield

4-3 The effect of the interaction between speed and seeding rate on grain yield:

The results of the statistical analysis show a significant effect of speed and seeding rate interaction on grain yield, as (S1T3) recorded the highest average yield of 4,317 kg/ha, while the treatment (S2T1) recorded an average yield of 3,274 kg/ha, which did not differ significantly from the treatment (S1T1).

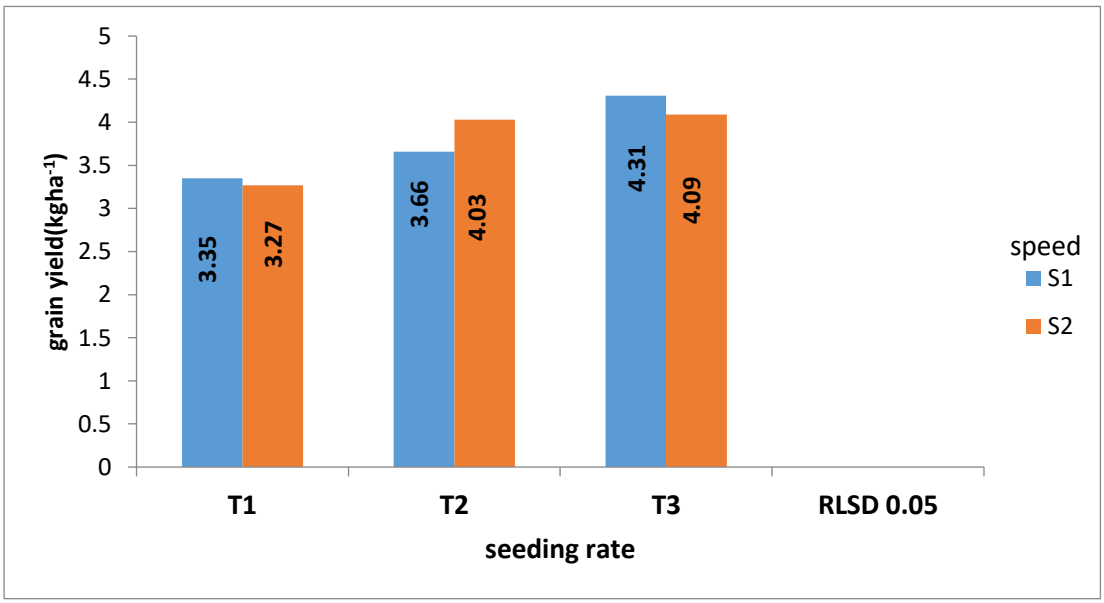

Figure (12) Effect of the interaction between speed and seeding rate on grain yield

Table (3) Effect of the combination used, forward speed, seeding rate, and interference on grain yield, kg/ha

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

		Speed			
Combination	Seeding rate	S1	S2	Combination and seeding rate interaction mean	Combination mean
W1	T1	3.531	3.475	3.503	4.028
	T2	4.208	4.209	4.209	
	T3	4.533	4.213	4.373	
W2	T1	3.172	3.072	3.122	3.523
	T2	3.122	3.850	3.486	
	T3	4.100	3.824	3.962	
	Combination and speed interaction mean				
	W1	4.091	3.966		
	W2	3.465	3.582		
	Seeding rate and speed interaction mean			Seeding rate mean	
	T1	3.351	3.274	3.313	
	T2	3.665	4.030	3.847	
	T3	4.317	4.019	4.168	
	Speed	3.778	3.774		

	Combination and speed	Seeding rate and speed	Combination and seeding rate	Combination	Speed	Seeding rate	Combination and Seeding rate and Speed
LSD	ns	0.2736	ns	0.0854	ns	0.2182	ns

Conclusions and recommendations:

Conclusions:

The results of the research show the following:

1- Increasing the forward speed of the tractor led to a significant increase in field efficiency.

2- Increasing the forward speed of the tractor led to a significant increase in moisture content and a decrease in the values of plant height and grain yield.

3- The seeder and furrow opener combination (W2) resulted in a decrease in the values of field efficiency and moisture content.

4- the seeding rate (T3) led to a significant increase in plant height and total yield.

Recommendations:

Through the results:

1- We recommend using the combined seeder and furrow opener for planting on lines, opening the furrows, seeding, and fertilizing.

2- We recommend using a speed of 6 km/h with the combined seeder and furrow opener to give them the best efficiency and highest crop production.

3-We suggest conducting other studies on the uses of the developed combined seeder and furrow opener and using the furrows method with several other crops in soils of different textures.

References

Ahmed, A. I., and Odisho, S. M. (2018). Isolation identification and pathotyping of Newcastle disease viruses form naturally infected chickens In Iraqi Kurdistan region. The Iraqi Journal of Agricultural Sciences, 49(1), 132-141. DOI:10.36103/ijas.v49i1.216

Aliyu, M., Zohora, F. T., Anka, A. U., Ali, K., Maleknia, S., Saffarioun, M., and Azizi, G. (2022). Interleukin-6 cytokine: An overview of the immune regulation, immune dysregulation, and therapeutic approach. International Immunopharmacology, 111, 109130. DOI: 10.1016/j.intimp.2022.109130

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

Alsahami, A. A., Ideris, A., Omar, A., Ramanoon, S. Z., and Sadiq, M. B. (2018). Isolation, identification and molecular characterization of Newcastle disease viruses in vaccinated chickens from commercial farms in the Sultanate of Oman. International journal of veterinary science and medicine, 6(2), 248-252. DOI: 10.1016/j.ijvsm.2018.08.007

Amarasinghe, A., Abdul-Cader, M.S., Almatrouk, Z., Van der. Meer, F., Cork, S.C., Gomis, S., and Abdul-Careem, M.F. (2018). Induction of innate host responses characterized by production of interleukin (IL)-1β and recruitment of macrophages to the respiratory tract of chickens following infection with infectious bronchitis virus (IBV). Veterinary microbiology, 215:1–10. DOI: 10.1016/j.vetmic.2018.01.001

Awad, M., Mosad, S., and El-Kenawy, A. (2020). Molecular differentiation between velogenic isolates and lentogenic LaSota strain of Newcastle disease virus. Mansoura Veterinary Medical Journal, 21(4), 193-198. DOI: 10.21608/mvmj.2020.146340

Bhutia, L. D., Rajkhowa, T. K., Ravindran, R., Arya, R. S., Roychoudhury, P., Mandakini, R. K., and Singh, Y. D. (2017). Occurrence of Newcastle disease in poultry population of Mizoram, India. Indian Journal of Veterinary Pathology, 41(2), 151-154. DOI:10.5958/0973-970X.2017.00037.2

Cattoli, G., Susta, L., Terregino, C., and Brown, C. (2011). Newcastle disease: A review of field recognition and current methods of laboratory detection. Journal of Veterinary Diagnostic Investigation, 23(4): 637-656. DOI: 10.1177/1040638711407887.

Chhabra, R., Ball, C., Chantrey, J., and Ganapathy, K. (2018). Differential innate immune responses induced by classical and variant infectious bronchitis viruses in specific pathogen free chicks. Developmental & Comparative Immunology, 87, 16-23. DOIi: 10.1016/j.dci.2018.04.026

Chi, L., Li, Y., Stehno-Bittel, L., Gao, J., Morrison, D. C., Stechschulte, D. J., & Dileepan, K. N. (2001). Interleukin-6 production by endothelial cells via stimulation of protease-activated receptors is amplified by endotoxin and tumor necrosis factor-alpha. Journal of interferon & cytokine research : the official journal of the International Society for Interferon and Cytokine Research, 21(4), 231–240. DOI: 10.1089/107999001750169871

Diel, D.G., da Silva, L.H.A., Liu, H., Wang, Z., Miller, P.J., and Afonso, C.L. (2012). Genetic diversity of avian paramyxovirus type 1: Proposal for a unified nomenclature and classification system of Newcastle disease virus genotypes. Infection, Genetics and Evolution, 12(8): 1770-1779. DOI: 10.1016/j.meegid.2012.07.012

Ecco, R., Susta, L., Afonso, C.L., Miller, P.J., and Brown, C. (2011). Neurological lesions in chickens experimentally infected with virulent Newcastle disease virus isolates. Avian Pathology, 40(2): 145-152. DOI: 10.1080/03079457.2010.544289

Fain, J.N. (2010). Release of inflammatory mediators by human adipose tissue is enhanced in obesity and primarily by the nonfat cells: a review. Mediators of Inflammation, 513948. DOI: 10.1155/2010/513948

Fensterl, V., and Sen, G.C. (2009). Interferons and viral infections. Biofactors 35: 14–20. DOI: 10.1002/biof.6

Getabalew, M., Alemneh, T., Akeberegn, D., Getahun, D., and Zewdie, D. (2019). Epidemiology, Diagnosis & Prevention of Newcastle disease in poultry. American Journal of Biomedical Science and Research, 16, 50-59. DOI: 10.34297/AJBSR.2019.03.000632

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

Hasan, A. R., Ali, M. H., Siddique, M. P., Rahman, M. M., and Islam, M. A. (2010). Clinical and laboratory diagnoses of newcastle and infectious bursal diseases of chickens. Bangladesh Journal of Veterinary Medicine, 8(2), 131-140. DOI:10.3329/bjvm.v8i2.11196

Kadhim, H. J., and Kuenzel, W. J. 2022. Interaction between the hypothalamo-pituitary-adrenal and thyroid axes during immobilization stress. Frontiers in Physiology, 13, 972171. DOI: 10.3389/fphys.2022.972171

Kadhim, H. J., Kang, S. W., and Kuenzel, W. J. 2019. Differential and temporal expression of corticotropin releasing hormone and its receptors in the nucleus of the hippocampal commissure and paraventricular nucleus during the stress response in chickens (Gallus gallus). Brain Research, 1714, 1–7. DOI: 10.1016/j.brainres.2019.02.018

Kadhim, H. J., Kang, S. W., and Kuenzel, W. J. 2021. Possible roles of brain derived neurotrophic factor and corticotropin releasing hormone neurons in the nucleus of hippocampal commissure functioning within the avian neuroendocrine regulation of stress. Stress (Amsterdam, Netherlands), 24(5), 590–601. DOI: 10.1080/10253890.2021.1929163

Kadhim, H. J., Kidd, M., Jr, Kang, S. W., and Kuenzel, W. J. 2020. Differential delayed responses of arginine vasotocin and its receptors in septo-hypothalamic brain structures and anterior pituitary that sustain hypothalamic-pituitary-adrenal (HPA) axis functions during acute stress. General and Comparative Endocrinology, 286, 113302. DOI: 10.1016/j.ygcen.2019.113302.

Kaiser P. (2010). Advances in avian immunology--prospects for disease control: a review. Avian pathology, 39(5), 309–324. DOI: 10.1080/03079457.2010.508777

Kim, K.S., Jung, H., Shin, I.K., Choi, B.R., and Kim, D.H. (2015). Induction of interleukin-1 beta (IL-1β) is a critical component of lung inflammation during influenza A (H1N1) virus infection. Journal of medical virology, 87:1104–1112. DOI: 10.1002/jmv.24138

Mao, Q., Ma, S., Schrickel, P. L., Zhao, P., Wang, J., Zhang, Y., ... and Wang, C. (2022). Review detection of Newcastle disease virus. Frontiers in Veterinary Science, 9, 936251. DOI: 10.3389/fvets.2022.936251

Millar, N.S., Emmerson, P.T. (1988). Molecular Cloning and Nucleotide Sequencing of Newcastle Disease Virus. In: Alexander, D.J. (eds) Newcastle Disease. Developments in Veterinary Virology, vol 8. Springer, Boston, MA. https://doi.org/10.1007/978-1-4613-1759-3_5

Mitra, S., and Leonard, W. J. (2018). Biology of IL-2 and its therapeutic modulation: Mechanisms and strategies. Journal of leukocyte biology, 103(4), 643-655. DOI: 10.1002/JLB.2RI0717-278R

Peiró, C., Lorenzo, Ó., Carraro, R., & Sánchez-Ferrer, C. F. (2017). IL-1β Inhibition in Cardiovascular Complications Associated to Diabetes Mellitus. Frontiers in pharmacology, 8, 363. DOI: 10.3389/fphar.2017.00363

Queiroz, M. A. F., Neves, P. F. M. D., Lima, S. S., Lopes, J. D. C., Torres, M. K. D. S., Vallinoto, I. M. V. C., Bichara, C. D. A., Dos Santos, E. F., de Brito, M. T. F. M., da Silva, A. L. S., Leite, M. M., da Costa, F. P., Viana, M. N. D. S. A., Rodrigues, F. B. B., de Sarges, K. M. L., Cantanhede, M. H. D., da Silva, R., Bichara, C. N. C., van den Berg, A. V. S., Veríssimo, A. O. L., Vallinoto, A. C. R. (2022). Cytokine Profiles Associated With Acute COVID-19 and Long COVID-19 Syndrome. Frontiers in cellular and infection microbiology, 12, 922422. DOI: 10.3389/fphar.2017.00363

Reda, A.M. and Jasim, N. S. (2022). Molecular Diagnosis of Newcastle Disease Virus by RT-RCR and Detection Fusion Gene Using Conventional PCR. Journal of Pharmaceutical Negative Results, 13 (03):983-944. DOI: 10.47750/pnr.2022.13.S03.144

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

Sawant, P., Verma, P., Subudhi, P., Chaturvedi, U., Singh, M., Kumar, R., and Tiwari, A. (2011). Immunomodulation of bivalent Newcastle disease DNA vaccine induced immune response by co-delivery of chicken IFN-γ and IL-4 genes. Veterinary immunology and immunopathology, 144: 36–44. DOI: 10.1016/j.vetimm.2011.07.006

Schmittgen, T. D., & Livak, K. J. (2008). Analyzing real-time PCR data by the comparative C(T) method. Nature protocols, 3(6), 1101–1108. DOI: 10.1038/nprot.2008.73

Schultz, U., & Chisari, F. V. (1999). Recombinant duck interferon gamma inhibits duck hepatitis B virus replication in primary hepatocytes. Journal of virology, 73(4), 3162–3168. DOI: 10.1128/JVI.73.4.3162-3168.1999

Selim, K., Adel, A., Eid, S., & Shahein, M. (2022). Development of real time reverse transcription loop-mediated isothermal amplification assay for rapid detection of genotype VII of Newcastle disease viruses. British poultry science, 63(6), 864–870. DOI: 10.1080/00071668.2022.2094219

Sen, A., Torab, A., Salam, S. M. A., Halder, B., and Alauddin, M. D. (2017). Comparative Study on Newcastle Disease and Infectious Bursal Disease in Chicken Submitted to Upazilla Veterinary Hospital, Bogra Sadar. Bangladesh Journal of Veterinary Science and Technology, 8(2).

Shabbir, M. Z., Zohari, S., Yaqub, T., Nazir, J., Shabbir, M. A., Mukhtar, N., Shafee, M., Sajid, M., Anees, M., Abbas, M., Khan, M. T., Ali, A. A., Ghafoor, A., Ahad, A., Channa, A. A., Anjum, A. A., Hussain, N., Ahmad, A., Goraya, M. U., Iqbal, Z., … Munir, M. (2013). Genetic diversity of Newcastle disease virus in Pakistan: a countrywide perspective. Virology journal, 10, 170. DOI: 10.1186/1743-422X-10-170.

Susta, L., Cornax, I., Diel, D. G., Garcia, S. C., Miller, P. J., Liu, X., Hu, S., Brown, C. C., & Afonso, C. L. (2013). Expression of interferon gamma by a highly virulent strain of Newcastle disease virus decreases its pathogenicity in chickens. Microbial pathogenesis, 61-62, 73–83. DOI: 10.1016/j.micpath.2013.05.009

Tanaka, T., Narazaki, M., & Kishimoto, T. (2014). IL-6 in inflammation, immunity, and disease. Cold Spring Harbor perspectives in biology, 6(10), a016295. DOI: 10.1101/cshperspect.a016295

Thi, H. T. H., & Hong, S. (2017). Inflammasome as a Therapeutic Target for Cancer Prevention and Treatment. Journal of cancer prevention, 22(2), 62–73. DOI: 10.15430/JCP.2017.22.2.62

Thomas, P.G., Dash, P., Aldridge, J.R. Jr., Ellebedy, A.H., Reynolds, C., Funk, A,J., Martin, W.J., Lamkanfi, M., Webby, R.J., Boyd, K.L., Doherty, P.C., and Kanneganti, T.D. (2009). The intracellular sensor NLRP3 mediates key innate and healing responses to influenza A virus via the regulation of caspase-1. Immunity, 30:566–575. DOI: 10.1016/j.immuni.2009.02.006

Wang, B., Zhu, J., Li, D., Wang, Y., Zhan, Y., Tan, L., Qiu, X., Sun, Y., Song, C., Meng, C., Ying, L., Xiang, M., Meng, G., & Ding, C. (2016). Newcastle disease virus infection induces activation of the NLRP3 inflammasome. Virology, 496, 90–96. DOI: 10.1016/j.virol.2016.05.023

Wang, Z., Liu, H., Xu, J., Bao, J., Zheng, D., Sun, C., Wei, R., Song, C., & Chen, J. (2006). Genotyping of Newcastle disease viruses isolated from 2002 to 2004 in China. Annals of the New York Academy of Sciences, 1081, 228–239. DOI: 10.1196/annals.1373.027

Worku, T., Dandecha, M., Shegu, D., Aliy, A., & Negessu, D. (2022). Isolation and Molecular Detection of Newcastle Disease Virus from Field Outbreaks in Chickens in Central Ethiopia. Veterinary medicine (Auckland, N.Z.), 13, 65–73. DOI: 10.2147/VMRR.S352727

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 13, Issue 2 (2024) PP 620-634

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/utjagr.v13i1.323*

Yeh, H. Y., Winslow, B. J., Junker, D. E., & Sharma, J. M. (1999). In vitro effects of recombinant chicken interferon-gamma on immune cells. Journal of interferon & cytokine research : the official journal of the International Society for Interferon and Cytokine Research, 19(6), 687–691. DOI: 10.1089/107999099313848

Zheng, Z., Peng, F., Xu, B., Zhao, J., Liu, H., Peng, J., Li, Q., Jiang, C., Zhou, Y., Liu, S., Ye, C., Zhang, P., Xing, Y., Guo, H., & Tang, W. (2020). Risk factors of critical & mortal COVID-19 cases: A systematic literature review and meta-analysis. The Journal of infection, 81(2), e16–e25. DOI: 10.1016/j.jinf.2020.04.021