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Determining of Optimum Concentration of Foliar Spraying with Gibberellic (GA_3) and Indole acetic acid (IAA) on Growth and Productivity of Three Sesame Genotypes (*Sesamum indicum* L.)

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Abstract:

A field experiment was carried out during summer season of 2020-2021 in two different locations within Nineveh Governorate, Wanah and Al-Gayyarah, to determine optimal concentration of foliar spraying with gibberellic acid (GA_3: 0,10 and 20 $mg.L^{-1}$) and indole acetic acid (IAA: 0, 5 and 10 $mg.L^{-1}$) on some growth traits, yield, components and quality traits of three sesame genotypes (Rafidain, Gujarat and Golmarmara). Results showed that gibberellic acid and indole acetic acid had a significant effect on most growth, yield and quality traits. Highest mean of these traits was obtained when sesame leaves were sprayed with gibberellic acid (GA_3) at a concentration of 20 $mg.L^{-1}$ and indole acetic acid (IAA) at a concentration of 10 $mg.L^{-1}$ This treatment yielded better results than control treatment and treatment with lower concentration. Moreover, results indicated that Gujarat genotype was superior to Golmarmara and Rafidain genotypes for all studied traits. Moreover, different binary and ternary interactions had a non-significant effect on most growth, yield and quality traits.

Kea words: Sesame genotypes, gibberellic acid (GA_3) and indole acetic acid (IAA).

Introduction:

Sesame (*Sesamum indicum* L.) belongs to family Pedaliaceae and is one of summer oil crops cultivated in Iraq. Importance of sesame lies in the fact that it contains a high percentage of oil, as the percentage of oil in seeds ranges from 40-50% (Garai and Datta, 1999). Its oil is light yellow in color after purification. It does not oxidize because it contains sesamol and sesoimolin. For this reason, it can be preserved for a long time without rancidity or oxidation for several years (Al-Doori, 2022). Its oil, which is classified as a semi-dry oil with an Iodine number of 104-118, is used to manufacture soap, butter, sprinkles, bread, cakes, and some types of sweets (its seeds contain 20% protein, 15% carbohydrates, and approximately 85% unsaturated fatty acids that reduce cholesterol and prevent heart disease (Behera et al., 2017). Sesamin, which increases the effective effect of insecticides, is extracted from oil. Meal is used in livestock and poultry diets because it contains vitamins, calcium, phosphorus and some protein materials. Sesame is grown in Iraq in central and southern governorates, in addition to Nineveh Governorate which is considered one of most important sesame-producing governorates (Al-Doori, 2022).

Plant growth regulators are natural or synthetic chemical compounds that play an important role in the process of growth and differentiation of plant cells and organs. Among most important plant growth regulators are Gibberellic (GA_3) and Indole acetic acid (IAA), they can be distinguished by their chemical composition and biological activity. Those growth regulators direct movement of nutrients, as it was found that areas containing high concentrations of indole acetic acid have the ability to accumulate nutrients in them. GA_3 and IAA can be used in sesame cultivation. These regulators stimulate cell division, elongation and seed formation. They increase production of lateral branches, especially floral ones, which increases the number of flowers and seeds, thus increasing production. They activate many enzymes that contribute to plant growth, development and increase activity of vital and physiological processes of cells by increasing the build of DNA, RNA and protein, as well as increasing moisture content of cells and controlling permeability of cell walls (Kadkhodaie et al., 2014 and Subash and Rafath, 2016). That's available in very small quantities in plant, as they are formed at tops of leaves and new buds and are able to move to rest of plant.

Therefore, foliar spraying method was used for these organizations to increase their motivational effects and effectiveness.

Many researches indicated that it is possible to obtain a high yield by using growth regulators, as (Behera et al., 2017) found that use of concentrations of IAA on sesame plants at 30 to 45 days after sowing led to an increase in number of seeds and total yield compared to no-additive treatments. Moreover, plant height increased using high concentrations of gibberellins (Roy and Nasiruddin, 2011). Given nutritional, medicinal and therapeutic importance of sesame crop and significant role played by foliar spraying with gibberellic acid and indole acetic acid in improving growth traits of plants and improving quality, this research was conducted to determine the optimal concentration of foliar spraying with gibberellic (GA_3) and indole acetic acid (IAA) on growth and productivity of three genotypes of sesame.

Materials and Methods:

This research was conducted during summer season of 2020-2021 in two locations: first was Wanah, which is 60 km west of Mosul city, and second is Gayyarah, 100 km south of Mosul city, to determine optimal concentration for foliar spraying with gibberellic acid (GA_3) and indole acetic acid (IAA) on some traits of growth, yield, its components and qualitative traits of three genotypes of sesame crop.

Split-split plot design was used with three replications for each experiment, as main-plots represented levels of gibberellic foliar spray (GA_3) (0,10 and 20 $mg.L^{-1}$) and levels of indole acetic acid (IAA). (0, 5 and 10 $mg.L^{-1}$) sub- plots, while genotypes (Rafidain, Gujarat and Golmarmara) represented sub-sub-plots. Coefficients were distributed according to a random complete block design (R.C.B.D.). The spraying date was determined at the stage of formation of six leaves on the plant. Experimental soil was analyzed before planting at a depth of 30 cm to study some of its chemical and physical properties according to Black, (1965), Page et al., (1982), and Tandon, (1999), as shown in table (1).

Table 1: Physical and chemical traits of soil field experiments in both Locations.

Traits	Wanah	Gayyarah

physical traits			
Sand (%)		68.00	19.00
Silt (%)		20.00	24.00
Clay (%)		12.00	57.00
Texture		Sandy	Clay
chemical traits			
Organic Mater ($gm.kg^{-1}$)		8.22	14.64
Total $CaCo_3$ ($ml.kg^{-1}$)		122.00	152.00
pH		7.6	7.4
E.C. $mmhos.cm^{-1}$		0.90	0.86
Available N	($mg.L^{-1}$)	44.24	46.22
Available P		10.00	12.00
Available K		146.44	140.22

Total experimental units was 81 experimental units with an area of (4.5 m^2) and dimensions (3.0 m length x 1.5 m width). To facilitate spraying operations and not transfer transactions from one board to another. The seeds of the three genotypes were sown manually by placing the seeds at a depth not exceeding 1 cm due to the small size of seeds with a plant density of 11.111 plants.ha^{-1} (Al-Doori, 2022) in the first week of April for both sites. Cultivation was on lines, the length of the line was 3 m, the number of lines on the board was 5 lines, and the distance between one line and another was 30 cm and between one plant and another 30 cm.

The experimental land was fertilized with 200 kg of nitrogen ha^{-1} (46% N), with half of it in the beginning added in the form of urea during planting and other half at branching stage and phosphate fertilizer was added in form of superphosphate (48% P_2O_5) at planting at a rate of 120 kg $P.ha^{-1}$. Potassium fertilizer in the form of potassium sulphate (48% K_2O) was added at planting by 30 $kg.ha^{-1}$. Experimental land was irrigated and weeds were removed whenever needed. In order to infect fields with aphids, control

was carried out using (Aktara) pesticide at a rate of 24 gm.100^{-1} liters of water (Syngenta company).

process of spraying nutrients (gibberellic and indole acetic acid) was carried out by preparing appropriate weights and spraying operations were carried out in early morning using a hand sprayer and control treatment (0 gibberellic, 0 indole acetic acid) was sprayed in all stages of spraying with water.

When the plants reached stage of full flowering, following measurements were taken:

Growth traits:

1- Plant height (cm): Measured from base of plant to its top.

2- Number of primary branches per $plant^{-1}$.

traits of product and its components:

Manual harvesting was done before seeds dispersed on 16 and 22 August for two locations (Wanah and Gayyarah), respectively. Ten plants were randomly taken from midlines and following traits were studied:

1. Number of total capsules per $plant^{-1}$.

2. Number of seeds per $capsule^{-1}$: Number of seeds was calculated for 100 capsules per treatment.

3. Weight of thousand seeds (gm): Thousand seeds from each treatment were manually counted and weighed with a sensitive electric scale.

4. Seed yield: Midlines were harvested for each treatment and seed yield was measured. Plants were placed in heaps exposed to sun and air for 2 to 3 days to dry appropriately. Then seeds were sieved, cleaned and purified from impurities and collected in bags after adding yield of ten plants taken from them, the yield was adjusted on the basis of 9% moisture and weights were converted to ton per ha^{-1}.

Qualitative traits:

Samples were dried in an electric oven at a temperature of 60-70 °C until weight stabilized to seeds chemical components. Then samples were ground and placed in bags. Moisture content of seeds was adjusted on the basis of 9%. Following chemical components were estimated:

Oil percentage in seeds: It was estimated using Soxhlet device following standard method (A.O.A.C., 1984)

Protein percentage in seeds: nitrogen in seeds was estimated using Microkjeldahl apparatus by distilling ammonia gas, and from which the percentage of crude protein was estimated based on Agrawal et al. (1980).

Unsaturated and standard fatty acids in oil: They were estimated by grinding (0.5 gm) of seeds and esterifying oil by adding (1 ml) of

reagent consisting of (25 ml) methanol alcohol to which (0.1 ml) acetyl chloride was added according to method of International Union of Applied Pure Chemistry (IUPAC) following standard method reported by Egan et al. (1981). Models were placed in a Gas Liquid Chromatography (G.L.C.) device equipped with an electronic computer (Stoffel et al., 1959; AL-Kaisey and Hussain, 1995).

Statistical analysis of all results was carried out on the basis of analysis of variance for studied traits according to split-split plot design with a randomized complete block design (R.C.B.D.) using a computer according to S.A.S. program. A comparison was made between means of coefficients using Duncan's multinomial test with level of 5% probability (Duncan, 1955). According to this test, averages followed by the same letters of the alphabet are not significantly different from each other and those followed by different letters are significantly different from each other (Steel and Torrie, 1980).

Results and Discussion:

Effect of foliar spraying with gibberellic acid:

Application of foliar spraying with gibberellic acid had a significant effect on all growth, yield and quality traits (tables 4 and 5). Treatment of spraying sesame levels with gibberellic acid (GA_3) at a concentration of 20 mg.L^{-1} gave it highest percentage for each: plant height (30.97 and 31.11%), number of primary branches per plant (37.87 and 45.70%), number of capsules per plant (98.84 and 73.92%), number of seed per capsules (68.07 and 68.86%), weight of thousand seed (53.50 and 55.34%), seed yield per plant (12.44 and 16.04%), total seed yield (128.57 and 107.91%), oleic acid (27.94 and 28.40%), linoleic acid (74.02 and 76.84%), palmitic acid (4.76 and 4.67%), oil (50.24 and 34.11%) comparing addition of less than that and comparative treatment in two locations Wanah and Gayyarah, respectively, protein (9.82%) in only Gayyarah location (tables 2 and 3). Result of current research is consistent with what Harrington et al., (1996), Sarkar et al., (2002), Rastogi et al., (2013), and Behera et al., (2017) found. All of them noticed that gibberellic acid plays an important role in growth and elongation of plant cells.

Effect of foliar spraying with indole acetic acid:

Additions of indole acetic acid at a concentrations of 5 and 10 mg.L^{-1} led to a significant increase in all growth traits, yield and quality traits except a number of primary branches per plant at Wanah

location and plant height at both Wanah and Gayyarah locations (tables 4 and 5). When spraying indole acetic acid on sesame leaves at a concentration of 10 $mg.L^{-1}$, percentage of increase was for each number of primary branches per plant (2.31%) in only Gayyarah location, number of capsules per plant (25.60 and 21.54%), number of seeds per capsules (20.93 and 21.90%), weight of thousand seed (17.88 and 17.06%), seed yield per plant (6.25 and 5.39%), total seed yield (33.19 and 28.57%), oleic acid (24.03 and 24.12%), linoleic acid (67.75 and 70.57%), palmitic acid (4.16 and 4.03%), oil (45.62 and 33.17%) and protein (11.08 and 8.99%) comparing addition of less than that and comparative treatment in two locations Wanah and Gayyarah, respectively. Many researches have confirmed the importance of indole acetic acid in stimulating cell division and elongation, formation of seeds, lateral branches and thus increasing production. In addition to increasing permeability of plant cell walls (Sadak et al., 2013, Rastogi et al., 2013, Muthulakshmi and Pandiyarajan, 2015 and Vekaria et al., 2017).

Effect of sesame genotypes:

The results of the statistical analysis showed (tables 4 and 5) a significant affected by different genotypes. The results in tables 2 and 3 showed Gujarat genotype gave highest rate for all traits, with an increase rate of plant height (33.49 and 42.11%), number of primary branches per plant (54.54 and 47.27%), number of capsules per plant (28.50 and 25.61%), number of seeds per capsules (34.64 and 36.13%), weight of thousand seed (46.26 and 44.82%), seed yield per plant (12.29 and 19.49%), total seed yield (37.06 and 44.70%), oleic acid (25.06 and 24.31%), linoleic acid (69.08 and 71.78%), palmitic acid (4.52 and 4.38%), oil (45.76 and 33.95%) and protein (11.22 and 9.94%) compared with Golmarmara and Rafidain genotypes in two locations Wanah and Gayyarah, respectively (tables 2 and 3). Superiority of Gujarat genotype in all traits may be mainly due to different genotypes of genotype itself. This has been confirmed by many researchers (Osman, 1993, Garai and Datta, 1999, Sharar et al., 2000 and Al-Doori, 2022).

Interactions effect:

The interaction effect between foliar spraying with gibberellic acid and indole acetic acid was significant in the number of capsules. $plant^{-1}$ and oleic acid percentage in Wanah location,

total yield in two locations, while Interaction effect between foliar spraying with gibberellic acid and genotypes, foliar spraying with indole acetic acid and genotypes was significant in total yield, oleic acid and protein percentage in Gayyarah location only. Interaction effect among three studied factors was significant in total yield in Gayyarah location only (tables 4 and 5).

Conclusions:

Plant growth regulators can be used as an alternative to chemical fertilizers, as it is possible to achieve highest total seed yield and highest oil percentage when spraying leaves of Gujarat genotype seeds with gibberellic acid at a concentration of 20 $mg.L^{-1}$ and indole acetic acid at a concentration of 10 $mg.L^{-1}$ regarding environmental conditions of Nineveh Governorate.

Table 2: Effect of foliar spraying with gibberellic acid, indole acetic acid, sesame genotypes and interactions on growth and yield components traits in both Wanah and Gayyarah locations.

Main effect and interaction	plant height (cm)		no. of primary branches. plant^{-1}		no.of capsules. plant^{-1}		no.of seed. capsulas^{-1}		1000 seeds weight (g.)		yield (gm.plant^{-1})	
	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah
Concentrations of gibberellic acid (mg.L^{-1})												
GA_3:0	c103.377	c117.158	b2.3556	c3.9641	c15.5415	c18.5674	c27.388	c27.942	c2.71918	c2.62662	b19.0915	b16.5844
GA_3:10	b120.779	b136.036	ab2.7804	b4.9426	b23.5068	b25.0278	b35.864	b36.626	b3.05430	b2.91140	a20.9067	a18.5941
GA_3:20	a135.231	a153.602	a3.2404	a5.7722	a30.9047	a32.2854	a46.022	a47.181	a4.16066	a4.07243	a21.4637	a19.2437
Concentrations of indole acetic acid (mg.L^{-1})												
IAA:0	a114.281	a128.213	a2.5459	b4.3852	c20.7483	c22.8883	c32.873	c33.554	c3.02374	c2.93425	c19.9844	b17.8122
IAA:5	a123.431	a138.420	a2.9863	a5.0230	b23.1501	b25.1749	b36.648	b37.290	b3.34454	b3.23646	b20.2415	b17.8374
IAA:10	a121.675	a140.164	a2.8441	a5.2707	a26.0546	a27.8174	a39.753	a40.905	a3.56586	a3.43974	a21.2359	a18.7726
Sesame genotypes												
G1: Rafidain	c100.976	b108.039	c2.2030	c4.0426	c20.1756	c22.4160	c30.514	c30.948	c2.68066	c2.61994	b19.6059	b16.9844
G2: Gujarat	a134.792	a153.538	a3.4041	a5.9548	a26.4546	a28.1534	a41.080	a42.120	a3.92605	a3.78620	a22.0170	a20.2922
G3:Golmarmara	b123.619	a145.219	b2.7693	b4.6815	b23.3228	b25.3112	b37.681	b38.681	b3.32743	b3.20432	b19.8389	b17.1456
Interactions effect												
GA_3×IAA	ns	ns	ns	ns	**	ns	ns	ns	ns	ns	ns	ns
GA_3×Genotypes	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
IAA×Genotypes	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

G × I × G	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

*, ** Significant at the 0.05 and 0.01 probability level, respectively. ns not significant.

Table 3: Effect of foliar spraying with gibberellic acid, indole acetic acid, sesame genotypes and interactions on yield and quality traits in both Wanah and Gayyarah locations.

Main effect and interaction	yield (ton.ha^{-1})		oleic acid (%)		linoleic acid (%)		palmitic acid (%)		oil (%)		protein (%)	
	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah
Concentrations of gibberellic acid (mg.L^{-1})												
GA_3:0	c1.68172	c2.40871	c15.5340	c15.6992	c55.388	c57.609	c3.31918	c3.22291	c36.366	c30.5515	a10.6437	c7.5219
GA_3:10	b2.74758	b3.26618	b20.7541	b21.3563	b63.864	b66.293	b3.65430	b3.50732	b43.214	b33.0296	a10.6678	b8.4700
GA_3:20	a3.84928	a4.99381	a27.9475	a28.4003	a74.022	a76.847	a4.76066	a4.67243	a50.248	a34.1178	a10.2030	a9.8204
Concentrations of indole acetic acid (mg.L^{-1})												
IAA:0	c2.35094	c3.08536	c19.0134	c19.4646	c60.873	c63.220	c3.62374	b3.53425	c41.055	b32.2548	c9.86590	b8.0219
IAA:5	b2.79357	b3.61757	b21.1827	b21.8617	b64.648	b66.956	b3.94454	a3.83646	b43.143	b32.2719	b10.560	a8.8004
IAA:10	a3.13406	a3.96576	a24.0395	a24.1295	a67.753	a70.572	a4.16586	a4.03196	a45.629	a33.1722	a11.0878	a8.9900
Sesame genotypes												
G1: Rafidain	c2.32334	c2.93009	c16.6098	c19.4332	c58.514	c60.615	c3.28066	c3.21623	b41.238	c31.6222	b10.0481	c7.7748
G2: Gujarat	a3.18981	a4.24889	a25.0670	a24.3157	a69.080	a71.787	a4.52605	a4.38212	a45.766	a33.9526	a11.2211	a9.9459
G3:Golmarmara	b2.76542	b3.48972	b22.5588	b21.7070	b65.681	b68.347	b3.92743	b3.80432	b42.823	b32.1241	b10.2452	b8.0915
Interactions effect												
GA_3×IAA	**	**	ns	**	ns	ns	ns	ns	ns	ns	ns	ns
GA_3×Genotypes	ns	**	ns	*	ns	ns	ns	ns	ns	ns	ns	**
IAA×Genotypes	ns	**	ns	*	ns	ns	ns	ns	ns	ns	ns	**
G × I × G	ns	*	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

*, ** Significant at the 0.05 and 0.01 probability level, respectively. ns not significant.

Table (4): Analysis of variance for growth and yield components traits in both Wanah and Gayyarah locations.

S.O.V.	D.F	plant height (cm)		no. of primary branches. plant^{-1}		no.of capsules. plant^{-1}		no.of seed. capsulas^{-1}		1000 seeds weight (g.)		yield (gm.plant^{-1})	
		Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah
Replications	2	6868.460	8969.021	5.287342	22.11832	1593.912	1271.671	2350.345	2506.189	15.36390	15.83768	41.54681	51.89530
A	2	136582.2**	144790.3**	180.4652**	16.58051**	140.794**	1374.358**	294.9666**	548.0894**	1.75440**	0.272672**	289.8596**	445.5909**
Error A	4	2143.572	5163.734	4.139292	3.400362	8.988589	9.367877	25.92120	32.78180	0.238360	0.377043	5.946612	7.900729
B	2	636.72ns	1125.1ns	1.3637ns	5.635633**	190.6266**	164.2861**	320.5075**	364.8247**	2.006090**	1.746793**	11.79537**	8.08882*
A×B	4	123.4334ns	25.6326ns	0.535401ns	0.507720ns	6.733584**	3.904402ns	9.953426ns	13.35588ns	0.182051ns	0.270910ns	2.079845ns	2.031251ns
Error A×B	12	338.6782	176.3715	0.551322	0.332278	1.819332	1.553664	1.814162	2.618083	0.159941	0.172425	1.926232	2.503980
C	2	8014.576**	15847.94**	9.748571**	25.58767**	266.1196**	222.1969**	785.5267**	884.0161**	10.47450**	9.181106**	47.75426**	93.90987**
A×C	4	31.3145ns	228.6309ns	0.150445ns	0.714259ns	2.125079ns	0.221148ns	0.323734ns	0.043775ns	0.021570ns	0.026832ns	2.675323ns	2.676042ns
B×C	4	28.7957ns	21.1864ns	0.386553ns	0.628555ns	0.589473ns	0.881197ns	1.098915ns	2.738564ns	0.041104ns	0.048321ns	1.397734ns	1.909603ns
A×B×C	8	38.1445ns	25.2939ns	0.505279ns	0.812392ns	0.951194ns	0.707575ns	1.167262ns	1.855366ns	0.035695ns	0.086139ns	1.300361ns	2.262951ns
Error ABC	36	92.7924	115.7195	0.474189	0.589236	1.109394	1.348484	19.19971	17.21409	0.088005	0.086426	0.973824	1.286860
Total	80												

Table (5): Analysis of variance for yield and quality traits in both Wanah and Gayyarah locations.

S.O.V.	D.F	yield (ton.ha^{-1})		oleic acid (%)		linoleic acid (%)		palmitic acid (%)		oil (%)		protein (%)	
		Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah	Wanah	Gayyarah
Replications	2	31.71671	46.81224	1048.914	1093.222	2350.345	2506.189	15.36390	15.92763	1300.879	90.19689	1.848981	36.02552
A	2	0.215585**	1.499690**	10.82140**	39.40698**	294.9666**	180.5387**	1.754401**	0.260182**	2584.266**	112.4633**	169.1772ns	9.735925**
Error A	4	0.636750	0.087176	2.477605	1.301745	25.92120	32.78180	0.238360	0.370857	205.4441	1.788148	21.65267	0.586296
B	2	4.163069**	5.308226**	171.5780**	146.9230**	320.5075**	364.8247**	2.006090**	1.697724**	141.6074**	7.436670**	10.14055*	7.107125**
A×B	4	0.387746**	1.513006**	3.096140ns	2.700721**	9.953426ns	13.35588ns	0.182051ns	0.278115ns	2.050769ns	0.896351ns	1.005629ns	0.127957ns
Error A×B	12	0.097788	0.039258	0.664580	0.437364	1.814162	2.618083	0.159941	0.174405	19.03651	1.324691	0.652332	0.234320
C	2	5.068427**	11.82934**	509.4313**	161.1665**	785.5267**	884.0161**	10.47450**	9.175499**	142.5563**	40.61682**	10.65193*	37.13834**
A×C	4	0.138161ns	0.992123**	1.189800ns	1.185177*	0.323734ns	0.043775ns	0.021570ns	0.027503ns	3.233950ns	0.869451ns	3.185535ns	2.881292**
B×C	4	0.109255ns	0.174830**	1.256409ns	1.127509*	1.098915ns	2.738564ns	0.041104ns	0.046962ns	1.976241ns	1.182685ns	0.874974ns	1.169842**
A×B×C	8	0.051205ns	0.133498*	1.331974ns	0.635605ns	1.167262ns	1.855366ns	0.035695ns	0.078647ns	2.029323ns	0.366252ns	0.564963ns	0.326640ns
Error ABC	36	0.022075	0.055396	4.201260	0.248227	19.19971	17.21409	0.088005	0.087317	4.447575	0.477160	1.322882	0.283827
Total	80												

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