

A Study of the Effect of Music on the Growth and Yield of Paddy

by

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Introduction: Effect of sonic vibrations on plants has been studied by different investigators and the opinions expressed have been controversial. Musical sound of certain types have been claimed to have beneficial effects by way of increasing the growth and productivity of a variety of plants. The possibilities of utilising music treatment to crops for increasing the yield of commercial produce have been examined experimentally and no unanimity of opinion has been expressed.

Singh and Stella Ponniah (1953) reported stimulation of protoplasmic movement in *Hydrilla verticillata* on subjecting the plants to sound emanating from a tuning fork and also music played on violin. In further studies, enhanced development of different plant parts were stated to have been observed as a result of such excitation in paddy (Purushothaman, 1962; Santhanakrishnan and Francis Nathan, 1962; Singh and Gnanam, 1962), in sugarcane (Stella Ponniah, 1956; Singh, 1962; Pannirselvam and Sankaranarayanan, 1962), in cotton (Shanmugasundaram and Thirumalaiswamy, 1962), in tobacco (Stella Ponniah, 1957; Singh and Krishnan, 1960), in vegetables (Stella Ponniah, 1956, 1957; Nainan, 1957; Pannirselvam and Savitha, 1961), and in certain water plants (Singh and Stella Ponniah, 1953).

Favourable responses resulting in increased growth and yield of produce have been reported from large scale experiments conducted by some workers (Purushothaman, 1962; Santhanakrishnan and Francis Nathan, 1962; Singh, 1963; Singh and Gnanam, 1960, 1962; Singh and Krishnan, 1960). However, experiments conducted at the Indian Agricultural Research Institute, New Delhi and the Central Rice Research Institute, Cuttack did not show any enhancement of yield of produce when seeds were pretreated with sound waves (Anon, 1964).

The experiments reported herein were conducted to critically examine the effects of musical sound on growth and yield of paddy.

Materials and Methods: The experiments were conducted on field grown paddy and also on plants cultured in pots to facilitate treatment with music under controlled conditions. Two strains of paddy, namely, ASD 5 of medium duration (150 days) and TKM 6 of short duration (110 days) were grown

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and studied under these experiments. ASD 5 was raised during the July-December season and TKM 6 during the January-April season of every year during the four year period 1963-64 to 1966-67.

For the studies under field conditions, two fields of 50 cents each, located in two different blocks (A and N blocks) of the wetlands, Central Farm, Agricultural College and Research Institute, Coimbatore, were chosen. The two blocks were separated by a distance of 500 yards from each other. The initial soil fertility in the two blocks was assessed and artificial fertilisers were applied to equalise the fertility status of the two fields chosen for the study. Each of the fields was divided into 40 plots of equal size and planting was done in lines at a spacing of 10" × 6" between rows and plants in the row for the medium duration crop and 10" × 4" for the short duration crop with two seedlings per hole. The treatment with music consisted in broadcasting recorded *nadaswaram* music of *Charukesi raga alapana* for half an hour daily between 7 a. m. and 7-30 a. m. Four loudspeakers were used to broadcast the music and they were kept on the field bund at a height of one foot above ground level. The height at which the loudspeakers were kept was increased in pace with the growth of the crop. The treatment was commenced one week after transplanting and continued till the ripening of the crop. In order to reduce the effects due to the uncontrollable differences in soil heterogeneity of the two fields chosen, the field in each block had one crop, subjected to music in one season and this was followed in the next year by a crop in that season without the treatment. Thus, during 1963-64 and 1965-66 the crop in 'A' block was subjected to music, while that in 'N' block was kept as control and in the alternating two years (1964-'65 and 1966-'67) it was *vice versa*. All agronomic practices recommended and prophylactic measures against pests and diseases were carried out similarly in both the treated and control plots of the two blocks.

(1) number of productive tillers per clump, (2) height of plant, (3) length of panicle, (4) number of well-filled and ill-filled grains per panicle, (5) size of leaf, (6) size of grain, (7) weight of 1000 grains and (8) yield of produce were recorded. Data were gathered from 400 plants in each of the blocks at the rate of ten plants per plot. Yields of grain and straw were recorded per plot of 450 sq. feet from the 40 plots of each field.

The data gathered for the four years of trials with each strain of paddy were pooled and subjected to a combined statistical analysis to draw final conclusions.

For the experiments conducted in specially constructed sound-proof rooms, the paddy seedlings were planted in 30 pots at the rate of five clumps of two seedlings per pot. On establishment, the seedlings in a set of ten pots

were subjected to music in one of the two rooms, those in the second set were kept in an adjacent sound-proof room without music treatment. Seedlings in the third set of ten pots were kept in the open for check. The plants subjected to music and the second set of plants were kept in their respective rooms during the time of treatment with music for the former and at all other times, they were kept outside along with the third set kept as check. The music treatment to the first set of potted plants was given by broadcasting recorded music through a loudspeaker hung from the ceiling of the room daily for half an hour between 9 a. m. and 9-30 a. m. The experiment was conducted for three years during the July-December season of each with ASD 5. Recorded music of *Charukesi raga* and *Sahana raga* on *nadaswaram* and *Navarasakannada* on flute was broadcast for the ASD 5 crop during the three years. Data on the characters mentioned in the case of the field experiments were gathered from these also, but were limited to the number of plants available in the pots.

Results and Discussion: The results of the field experiments conducted with ASD 5 and TKM 6 are summarised in Table 1. The combined statistical analysis of the data show that the differences in grain yield or yield of straw were not significant. Purushothaman (1967), Santhanakrishnan and Francis Nathan (1962) and Singh and Gnanam (1962) have however, indicated that higher yields could be obtained in experiment conducted at different locations in paddy. Such an expression could not be realised in the present set of tests. Variations in yield of grain and straw were noticed in both the treated and control plots during the four year period which could be attributed to differences in uncontrollable, environmental factors existing in the two fields chosen. The alternation of the treated and control plots between the two blocks in successive years and the pooled analysis of the data helped in the best measure the elimination of the effects of these differences.

Combined analysis of the data on the other attributes studied herein also showed no significant differences in the treated and control in case of ASD 5. In the case of TKM 6, however, a significant negative deviation was evident in music treated plots in some attributes, but this was not reflected in the yield of produce.

In all three years of experiments with potted plants conducted in sound-proof rooms, no significant differences in yield of grain or straw could be observed in treated and control plants. The differences in height of plants, length of panicle, number of ill-filled grains per panicle, 1000 grain weight, size of leaf and size of grain between treated and control were not consistent. The data are presented in Table 2.

TABLE 1. Results of Combined Analysis of the Field Experiment with Strains ASD 5 and TKM 6

Particulars	ASD 5				TKM 6				
	Music treated	Control	Standard Error	'F' Test	Music treated	Control	Standard Error	'F' Test	Critical Difference (P=0.05)
Yield of grains	4006.5	3920.9	41.83	No	3216.3	3232.1	170.77	Yes	0.9315
As a percentage of control	101.9	100.0	1.06	—	99.5	100.0	5.285	—	—
Yield of straw (kg/ha)	5517.2	5594.3	65.28	No	4447.8	4497.2	274.77	No	—
As a percentage of control	98.6	100.0	1.16	—	98.9	100.0	6.105	—	—
Number of tillers per clump	9.49	10.16	0.4809	No	9.99	11.02	0.241	Yes	1.084
Height of plant (cm)	136.2	137.9	0.9354	No	118.4	120.5	2.74	No	—
Length of panicle (cm)	25.28	25.50	0.167	No	23.56	24.01	0.207	Yes	0.9315
Number of grains per panicle	133.4	135.3	3.55	No	84.3	90.06	4.562	Yes	20.94
Number of ill-filled grains per panicle	25.72	25.97	1.833	No	13.88	14.84	1.085	No	—
Spikelet sterility %	16.16	16.10	—	—	14.59	14.54	—	—	—
1000 grain weight (g)	21.75	21.46	0.01134	No	18.77	19.03	0.06	Yes	0.27
Length of leaf (cm)	54.03	55.72	2.425	No	—	—	—	—	—
Breadth of leaf (cm)	0.970	1.031	0.08662	No	—	—	—	—	—
Area of leaf (sq. cm)	41.33	46.15	—	—	—	—	—	—	—
Length of grain (mm)	7.905	7.917	0.000058	No	8.236	8.310	0.0108	Yes	0.0488
Breadth of grain (mm)	2.777	2.807	0.01838	No	2.418	2.470	0.0166	Yes	0.0747
Thickness of grain (mm)	2.040	2.036	0.00828	No	1.869	1.882	0.0257	Yes	0.1156
L/B Ratio of grain	2.846	2.820	—	—	3.423	3.445	—	—	—

TABLE 2. Results of *P. t.*-culture Experiment with Strain ASD 5

Particulars	1964-65 (Charukesi)					1965-56 (Sahana)					1966-67 (Nayarasikannada)							
	Music treated	Untreated	Outside check	S.E.	'F' Test	C.D. (P=0.05)	Music treated	Untreated	Outside check	S.E.	'F' Test	C.D. (P=0.05)	Music treated	Untreated	Outside check	S.E.	'F' Test	C.D. (P=0.05)
Yield of grain per pot (g)	45.41	43.81	39.81	2.8	No	—	15.37	13.98	14.31	2.125	No	—	15.50	13.80	14.40	1.1	No	—
Yield of straw per pot (g)	85.2	81.3	81.8	5.95	No	—	17.94	17.07	17.40	2.335	No	—	24.4	23.1	22.8	0.86	No	—
Number of tillers per clump	5.24	5.86	5.92	0.362	No	—	3.18	3.06	3.20	0.3056	No	—	6.02	5.86	5.30	0.23	No	—
Height of plant (cm)	95.41	90.73	91.77	1.27	Yes	3.56	89.4	80.9	89.4	3.5	No	—	81.86	83.30	84.06	2.053	No	—
Length of panicle (cm)	23.59	22.87	23.28	0.176	No	—	21.35	20.19	21.98	0.508	No	—	19.89	20.96	20.38	0.953	Yes	2.663
Number of grains per panicle	125.6	113.3	123.7	5.23	No	—	84.1	82.04	95.04	5.047	No	—	50.40	51.60	49.04	2.87	No	—
Number of illfilled grains per panicle	28.1	26.4	8.1	2.19	Yes	6.122	13.96	9.4	10.28	1.29	Yes	3.604	10.94	20.62	12.90	1.263	Yes	3.53
Spikelet sterility %	18.3	19.0	6.1	—	—	—	14.2	10.3	9.8	—	—	—	17.83	28.56	20.83	—	—	—
1000 grain weight (g)	17.14	17.52	17.76	0.11	Yes	0.307	18.84	18.50	17.44	0.124	Yes	0.3465	19.34	19.84	19.51	0.216	No	—
Length of leaf (cm)	41.75	36.99	34.59	1.048	Yes	2.928	33.88	31.58	32.58	1.13	No	—	27.39	28.07	26.88	0.597	No	—
Breadth of leaf (cm)	0.750	0.584	0.630	0.012	Yes	0.0335	0.494	0.546	0.538	0.0175	No	—	0.618	0.592	0.620	0.0193	No	—
Area of leaf (sq. cm)	24.65	17.01	17.16	—	—	—	13.17	13.58	13.80	—	—	—	13.32	13.08	13.12	—	—	—
Length of grain (mm)	7.615	7.718	7.805	0.036	Yes	0.1045	7.652	7.714	7.643	0.0299	No	—	7.526	7.492	7.539	0.0246	No	—
Breadth of grain (mm)	2.698	2.706	2.712	0.047	No	—	2.083	2.793	2.714	0.0298	Yes	0.0865	2.518	2.568	2.573	0.0016	Yes	0.046
Thickness of grain (mm)	2.100	2.201	2.200	0.0033	No	—	2.014	2.021	1.996	0.01003	No	—	1.914	1.927	1.906	0.0076	—	—
L/B ratio of grain	2.822	2.852	2.816	—	—	—	2.852	2.762	2.816	—	—	—	2.988	2.917	2.930	—	—	—

Singh and associates (1953 to 1963) have observed an increased growth in paddy plants and increase in metabolic activities related to growth in other plants as a response to treatment of plants to musical sound. The field experiments and the tests conducted under controlled conditions in the present investigations do not substantiate the reports made previously.

It is to be inferred from the above that subjection of the paddy crop to recorded music is not beneficial in enhancing the yield of grain or straw or the contributory attributes.

Summary: Experiments were conducted to study the effects of musical sound on the growth and yield of paddy using two strains ASD 5 of medium duration and TKM 6 of short duration under field conditions and in pot culture in sound-proof rooms. Recorded music was broadcast through loudspeakers to the growing crop from ten days after transplanting till maturity for half an hour daily. No enhancement of yield of grain or straw or correlated attributes could be observed, during the four year period of study under field conditions or in the experiments conducted for three years under controlled conditions in sound proof rooms.

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The Bionomics of the Syrphid Fly, *Xanthogramma Scutellare* Fab. * (Syrphidae : Diptera)

by

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Very few cultivated plants escape the attention of one or other kind of aphid. In nature aphids are always accompanied by their natural enemies *viz.*, the larvae of syrphid flies, lace-wings and the larvae and adults of lady bird beetle to a smaller or greater extent. Of the various predators recorded, syrphid fly is of different species and one of the most common predators prevalent in this region. In view of its importance, studies on its biology were undertaken to help and understand various phases of life and behaviour. It appears that *Xanthogramma* sp. is prevalent in Delhi, Meerut, Saharanpur, Bulandshahr and Agra. (Anand *et al.* 1967 & Nayar and Nayar 1965). According to Patel *et al.* (1968) *Xanthogramma scutellare*, Fab. is prevalent in Gujarat also.

Records of the incidence of *Xanthogramma scutellare*, Fab. indicate that it feeds on *Aphis persicae*, Boyer. on peach (Hardenberg 1913), on *Lipaphis erysimi*, Kalt. on cabbage (Patel *et al.* 1968) *Toxoptera graminum* on wheat (Moore 1913). Studies on the biology of *Xanthogramma* sp. made by Deoras (1942) are only of general nature, and much remains to be known about its behaviour *etc.*

Materials and Methods: Initial culture was started by collecting large number of larvae and pupae of *Xanthogramma scutellare*, Fab. from the fields of the College Farm. They were reared in the laboratory. The adult syrphid

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