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NOTE:

MEIOTIC FEATURES OF THE MALE GREEN LEAFHOPPER *Nephotettix virescens* (Distant) SAMPLED FROM TUNGRO AND NON-TUNGRO RICE FIELDS

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The green leafhopper, *Nephotettix virescens* (Distant), is one of the serious pests of rice throughout Asia. It feeds on rice crops from seedling stage to harvest (John and Rao, 1971). It is the most efficient vector of rice tungro virus, a very destructive disease of rice in the Philippines and throughout Asia (Rivera and Ou, 1965). *N. virescens* is a dioecious, sexually reproducing species. In its bisexual reproduction, the two major episodes are the processes of meiosis durinG gamete formation (spermatogenesis and oogenesis) and fertilization to form the diploid zygote. The perpetuation of *N. virescens*, therefore, is meiosis-based. Meiotic division stages enable the maintenance of normal diploid chromosome number of the species. It generates genetic variability by random assortment of paternal and maternal chromosomes and crossing-over (Burns and Bottino, 1989). The success of every species as a reproducing unit is usually assessed through meiotic divisions using meiotic index as parameter. The higher the meiotic index, the higher is the reproductive potential of the species.

The meiotic indices of male *N. virescens* randomly sampled from non-tungro-infested rice fields (cropped with IR 74) and tungro-infested rice fields (cropped with IR 64) at Bay, Laguna were determined. Table 1 shows the comparative data and the analysis of their variance. The two populations of *N. virescens* differ significantly in their meiotic indices. Male *N. virescens* randomly sampled from tungro-infested rice fields possessed significantly higher meiotic indices ranging from 75 to 95%. On the other hand, males from the non-tungro-infested rice fields had meiotic indices ranging from 57 to 92% with a mean of 78%.

In newly emerged male *N. virescens*, spermatogenesis is actively occurring. One of its major events is the meiotic division which occurs immediately after the formation of primary spermatocytes. The frequency of these spermatocytes or meiocytes ultimately determines the frequency of male gametes or spermatozoa to be formed. Therefore, the higher the frequency of meiocytes, the higher is the expected frequency of sperm cells to be formed to fertilize the ova. Such frequency of meiocytes varies significantly in populations of *N. virescens* randomly sampled from tungro- and non-tungro-infested rice fields at Bay, Laguna (Table 2). *N. virescens* from tungro-infested rice fields had more meiocytes than those from non-tungro

rice fields. The higher frequency of meiocytes in *N. virescens* from tungro-infested rice fields coincides with higher meiotic index compared with those from non-tungro infested rice fields.

These preliminary cytological findings imply that one of the features of *N. virescens* vectors of tungro viruses is high reproductive potential. In sexually reproducing species like *N. virescens*, the reproductive potential is directly proportional with the amount of genetic variation since enormous variations are produced by the processes of meiosis and fertilization. This study, therefore, reveals that male *N. virescens* tungro vectors are meiotically superior to those from non-tungro rice fields.

The testicular cells of newly emerged *N. virescens* consist not only of meiocytes but also non-meiocytes or non-dividing cells which are metabolically active but not undergoing meiotic division process. These non-meiocytes are the ones significantly numerous in *N. virescens* sampled from non-tungro-infested rice fields compared with those *N. virescens* sampled from tungro-infested rice fields (Table 3). All these non-meiocytes are the spermatogonial cells that are supposed to differentiate into primary spermatocytes. However, due to unknown reasons maturation or gametogenetic process was halted. Similar non-meiocytes were observed in *N. virescens* from tungro-infested areas but the frequency is significantly lower since majority of the spermatogenetic cells complete the gametogenetic process.

To summarize, the meiotic features of the male *N. virescens* sampled from tungro- and non-tungro rice fields at Bay, Laguna are as follows:

N. virescens samples	Meiotic Index	Frequency	
		Meiocytes	Non-meiocytes
Tungro-infested areas (IR 64)	High	High	Low
Non-tungro infested areas (IR 74)	Low	Low	High

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Table 1. Meiotic indices of the male green leafhopper, *Nephotettix virescens* (Distant),sampled from tungro and non-tungro-infested rice fields at Bay, Laguna (1995) and the analysis of their variance (ANOVA).

Treatment	Meiotic Index (%)	Treatment Total (T)	Treatment Mean
N. virescens from tungro-infested rice field (cropped with IR 64)	78 80 87 90 86 88 92 93 92 90 92 94 90 95 93	86 80 75 87 83} 89 91 87 89 87} 94 91 88 88 92}	2,647	88.23
N. virescens from tungro-infested rice field (cropped with IR 74)	70 92 78 87 89 88 86 86 83 83 51 66 72 78 65	71 81 77 91 82} 85 83 82 83 85} 63 67 81 72 69}	2,346	78.20
Grand Total (G)			4,993	
Grand Mean				83.22

Analysis of variance of the meiotic indices of *N. virescens*

Source of Variation	Degree of Freedom	Sum of Squares	Mean Square	computed F	Tabular F 5%	Tabular F 1%
Treatment	1	1510.83	1510.83	21.67**	4.00	7.08
Experimental Error	58	4043.36	69.713			
Total	59	5554.19				

cv = 10%

** significant at 1% level.

Table 2. Frequency of meiocytes in testes of newly-emerged green leafhooper, Nephotettix virescens (Distant) randomly sampled from tungro-and non-tungro-infested rice fields at Bay, Laguna (1995) and analysis of variance (ANOVA).

Treatment	Number of Meiocytes							Treatment Total (T)			Treatment Means	
N. virescens from	97	80	244	121	182	151	127	93	113	80}		
tungro - infested	111	179	104	97	112	93	86	86	122	78}	4,472	149
rice fields	212	198	215	208	192	195	205	216	235	240}		
(cropped with IR 74)												
N. virescens from	105	54	50	176	173	60	184	95	58	78}		
non - tungro-	166	96	69	119	73	50	88	77	105	67}	2,823	94
infested ricefields	55	86	92	103	75	72	88	112	96	101}		
(cropped with IR 64)												
Grand Total (G)											7,295	
Grand Mean 122												

Analysis of variance of the meiocytes of *N. virescens*

Source of Variation	Degree of Freedom	Sum of Squares	Mean Square	Computed F	Tabular F	
					5%	1%
Treatment	1	45,320.02	45,320.02	19.45**	4.00	7.08
Experimental Error	58	135,152.6	2,330.22			
Total	59	180,472.6				

cv = 40%

** significant at 1% level

Table 3. Frequency of testicular non-meiocytes of newly-emerged green leafhopper, *Nephotettix virescens* (Distant), randomly sampled from tungro- and non-tungro-infested rice fields at Bay, Laguna (1995) and analysis of variance (ANOVA).

Treatment	Number of Meiocytes										Treatment Total (T)	Treatment Means
N. virescens from	28	20	36	13	29	25	32	30	17	16	}	
tungro-infested	15	15	9	9	12	12	8	13	15	12	}	566 18.37
rice fields	18	12	24	12	15	12	20	33	32	22	}	
(cropped with IR 74)												
N. virescens from	44	5	14	27	21	25	42	39	6	47	}	
non - tungro-	21	16	11	24	15	9	18	17	22	12	}	823 27.43
infested rice fields	42	45	36	29	40	42	44	27	38	45	}	
(cropped with IR 64)												
Grand Total (G)											1389	
Grand Mean												23.15

Analysis of variance of the non-meiocytes of *N. virescens*

Source of Variation	Degree of Freedom	Sum of Squares	Mean Square	Computed F	Tabular F 5%	Tabular F 1%
Treatment	1	1,100.82	1,510.83	12.12**	4.00	7.08
Experimental Error	58	7,230.63	124.67			
Total	59	8,331.65				

cv = 48%

** significant at 1% level