Table 2. Influence of xylanase pretreatment on bleachability of hard wood kraft pulp

Particulars	Control	Enzyme treated
Enzyme stage (X)		
Xylanase enzyme applied XU/g	–	10
pH	6.0	6.0
Chlorination stage (C)		
Chlorine as Cl_2 % applied	3.20	3.20
Consumed	3.13	3.06
Final pH	2.2	2.1
Extraction stage (E)		
Alkali as NaOH % applied	2.00	2.00
Consumed	1.42	1.26
pH Initial	12.0	12.2
Final	11.5	11.6
Hypo stage (H)		
Hypo as Cl_2 % applied	1.92	1.92
consumed	1.38	1.70
pH Initial	9.8	10.2
Final	8.6	8.7
Final brightness % ISO	77.3	81.7
Brightness gain	–	4.4
Viscosity cps	5.4	5.0

Bleaching conditions:

	X	C	E	H
Temperature (°C)	50	Amb	60	40
Time (min)	120	30	60	120
Consistency (%)	10	3	8	8

enzyme pretreatment has insignificant influence on viscosity of the pulp, which indicates that it did not have much pure cellulose degrading enzymes. Generally, xylanase enzyme pretreatment is used to improve the brightness target in total chlorine free and elemental chlorine free prebleaching or to reduce the active chlorine components during the bleaching by reduced chlorine dosage to save chemicals and decrease the AOX production. In the present study we have applied the xylanase enzyme prebleaching concept to improve the final brightness of the pulp without any additional chemical charge Similar to the present study, enzyme pretreatment before the peroxide delignification/bleaching is also found to improve the final brightness of various pulps[9,13].

From the above results it is concluded that introduction of xylanase enzyme pretreatment stage, (10 XU/gram of pulp) in CEH bleaching of hard wood kraft pulp before chlorination stage would improve final brightness of pulp without any additional chemical charge, resulting in lower pollutant generation. The pulp properties are unaffected.

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ACKNOWLEDGEMENTS. We thank the TNPL management for granting permission to publish this work.

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Greater fertility of *Drosophila ananassae* flies possessing high number of sternopleural bristles

Drosophila ananassae, a cosmopolitan and domestic species, is of common occurrence in India. It occupies a unique status in the whole of genus *Drosophila* due to certain peculiarities in its genetic behaviour[1]. The work done on population genetics, behaviour genetics and crossing-over in *D. ananassae* by Indian workers has been reviewed by Singh[2]. We conducted investigations on quantitative genetics with respect to sternopleural bristle number in Indian *D. ananassae*[3–5] and the results have shown that there is a genetic heterogeneity in Indian populations of *D. ananassae* with substantial amount of additive genetic variation for this trait

Table 1. Results of fertility tests for different selection lines (low line – L_1 and L_2; high line – H_1 and H_2; stabilizing line – S_1 and S_2)

Lines	Total number of females tested	Number of progeny produced	Mean number of progeny per female	Average of two replicates
L_1	33	528	16.00 ± 3.24	17.66 ± 2.34
L_2	33	638	19.33 ± 3.41	
S_1	33	689	20.91 ± 3.93	20.33 ± 2.21
S_2	34	671	19.74 ± 2.17	
H_1	35	1326	37.89 ± 4.55	37.33 ± 2.97
H_2	35	1287	36.77 ± 3.89	

Table 2. Comparison of mean number of progeny/female between different selection lines by means of *t*-test

Selection lines	Mean number of progeny/female	*t*-value	df	*P*
High line Low line	37.33 ± 2.97 17.66 ± 2.34	5.156	134	< 0.001*
High line Stabilizing line	37.33 ± 2.97 20.33 ± 2.21	4.564	135	< 0.001*
Low line Stabilizing line	17.66 ± 2.34 20.33 ± 2.21	0.820	131	> 0.05

*Significant.

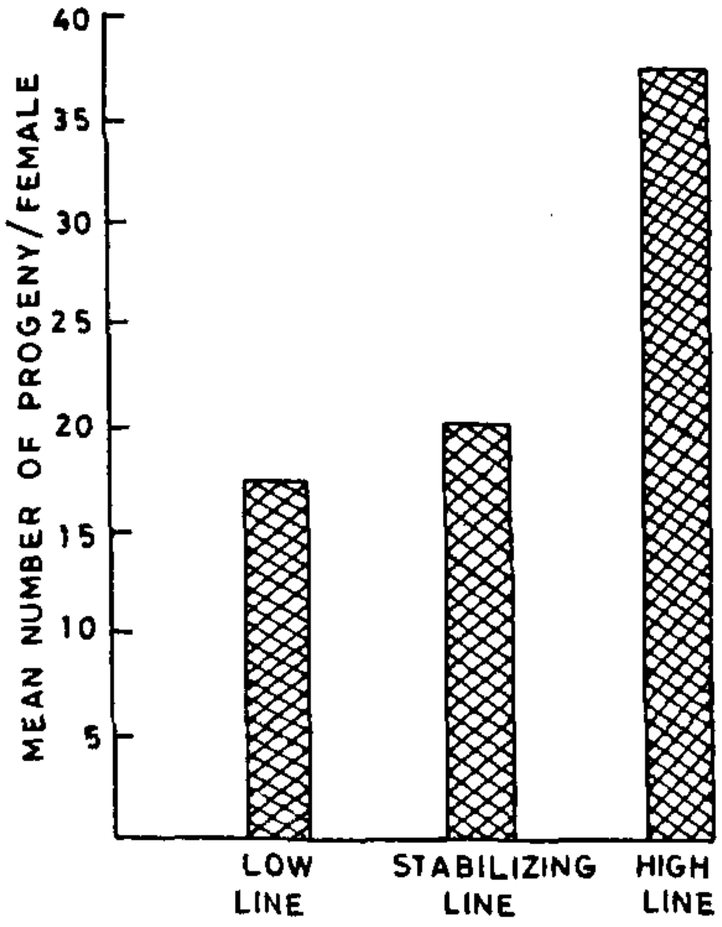

Figure 1. Mean number of progeny produced per female in low, stabilizing and high lines in *Drosophila ananassae*.

which is under polygenic control. There is also a positive response to directional and stabilizing selection for sternopleural bristle number which lends further support for polygenic basis of sternopleural bristle phenotypes in *D. ananassae*[4,5].

We conducted artificial selection experiments for high and low number of sternopleural bristles for 13 generations in *D. ananassae*. Separate high (H_1, H_2) and low (L_1, L_2) lines could be established[5]. We also conducted stabilizing selection experiments for bristle number for 15 generations and two replicates (S_1, S_2) of stabilizing selection line with intermediate bristle number could be established[4]. Mating success of *D. ananassae* flies possessing high and low number of sternopleural bristles was studied by direct observation in mating chamber and the results have shown that the females and males with high number of sternopleural bristles are more successful in mating than those with low number of bristles[6]. In order to test the effect of sternopleural bristle phenotypes on fitness in *D. ananassae*, fertility tests were carried out with flies having high (H_1, H_2), low (L_1, L_2) and intermediate number (S_1, S_2) of sternopleural bristles and the results are reported here.

Flies used in fertility tests were taken from two replicates of high line, two replicates of low line (after G_{13} of directional selection) and two replicates of stabilizing line (after G_{15} of stabilizing selection). From each line, virgin flies were collected and aged for about seven days. For pair mating, flies having known bristle number were taken from each line (in high line, females and males having more than 23 bristles were selected, in low line, females and males possessing less than 14 bristles were selected and in the case of stabilizing line, females and males having 17 bristles were selected). Each pair was placed in a fresh food vial for two days in order to mate. They were transferred into fresh food vials after mating. Three days later they were transferred to another set of food vials and again after three days, the flies were transferred to fresh food vials. Three more days afterwards, the flies were discarded. Thus there were three sets of vials (total time 9 days) for counting the progeny. The number of flies emerged in each vial was counted and the total number of progeny produced by a single female in 9 days was calculated. Mean number of progeny per female was calculated for low, high and stabilizing selection lines and *t*-test was performed to compare the fertility of flies in different selection lines.

A total of six lines were tested for fertility and the results are given in Table 1. The total number of females tested in different lines varies from 33 to 35. The mean number of progeny produced per female in different lines varies from 16.00 (L_1) to 37.89 (H_1). The average of two replicates shows that the flies having higher number of bristles produced more progeny than the flies having lower number of bristles. However, the mean number of progeny per female in stabilizing selection line is less than the high line but more than the low line. Figure 1 shows the mean number of progeny produced per female in high, low and stabilizing selection lines.

A comparison of mean number of progeny produced per female between different lines was done by means of *t*-test (Table 2). It is evident that the difference is significant ($P < 0.001$) between high and low lines and also between high and stabilizing lines ($P < 0.001$). However, the difference in mean number of progeny between low and stabilizing lines is not significant ($P > 0.05$). These results indicate that the flies having more bristles have greater fertility than those with low and

intermediate number of bristles. Although the difference between low and stabilizing lines is not significant statistically, the flies from stabilizing selection line produce more progeny and show higher fertility than the low line flies.

It has been found that *D. ananassae* flies possessing high number of sternopleural bristles are more successful in mating than those with low number of bristles[6]. Thus *D. ananassae* flies with high number of sternopleural bristles are more successful in mating and also show greater fertility than the flies with low number of sternopleural bristles. This provides evidence for a positive correlation between sternopleural bristle number, mating propensity and fertility in *D. ananassae*.

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Chronic arsenic toxicity in West Bengal

I have read with interest the paper 'Arsenic in ground water in seven districts of West Bengal, India – The biggest arsenic calamity in the world', by Mandal *et al.* (*Curr. Sci.*, 1996, **70**, 976–986). Without undermining the gravity of arsenic calamity in West Bengal, I believe that many figures presented in the paper are not based on materials and methods used for the scientific presentation. Materials investigated in the study are water samples of the affected villages and hair, nail, skin and urine samples of some of the people residing in those villages. No scientific epidemiological methodology was described in the paper. Under the circumstances, how was the figure of 20% of the people suffering from chronic arsenic toxicity due to drinking arsenic contaminated water arrived at? Similarly the statement that more than 200,000 people have skin lesions is conjectural. The figure may be much less or much more. Unless an epidemiological survey using statistically designed sampling method involving the whole affected region is carried out one cannot be sure regarding the total number of the affected people.

It needs to be emphasized that diagnosis of chronic arsenic toxicity on the basis of the only finding of diffuse melanosis is fraught with over diagnosis of dark complexioned rural population as suffering from the clinical disease. One is therefore not sure whether 60% of children of Madanpur village of Murshidabad are actually suffering from chronic arsenicosis.

It needs to be further stated that muscle biopsy is not done for the confirmation of diagnosis of chronic arsenic toxicity. Though detection of high level of arsenic in body tissues like nail, hair, skin scale in association of characteristic clinical manifestations of chronic arsenic toxicity confirm the diagnosis of arsenicosis, one can have definitive features of the disease in absence of elevation of arsenic level in those tissues.

We have recently completed an epidemiological survey of South 24 Parganas, one of the affected districts with financial assistance from Rajiv Gandhi National Drinking Water Mission.

We have observed typical raindrop pigmentation of the skin and thickening of the palm and soles characteristic of chronic arsenicosis in 8.82% (152) and 3.64% (368) respectively among 4171 persons who were drinking arsenic-contaminated water (0.05–3.2 mg/l). On the other hand, pigmentation was found in 13 cases and thickening of palm and sole in 4 cases out of 3235 persons drinking water having arsenic level between 0.01 and 0.05 mg/l. None of the 277 people drinking water having arsenic level less than 0.01 mg/l had any pigmentation of skin or keratosis.

Since 1983 we have investigated 248 patients suffering from chronic arsenic toxicity due to drinking arsenic-contaminated water and attending our Post Graduate Medical Institute. The common presenting features found in these patients were rain-drop pigmentation (94.35%), thickening of palm and sole (65.3%), dyspepsia (65%), cough with or without expectoration (62.5%) and burning sensation of the eyes (29.8%). Important physical signs were anaemia (43.9%), hepatomegaly (76.6%), splenomegaly (29.4%), rhonchi and crepitations of the lung due to restrictive and/or obstructive lung disease (30.24%) and polyneuropathy (8.04%). Skin cancer was found in 2% of the case.

The clinical manifestations of chronic arsenicosis as observed in West Bengal are varied and more severe than those observed in other parts of the world.

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Mandal et al. reply:

We appreciate Guha Mazumder's comments but some clarifications are necessary.

For the last 2 years the School of Environmental Studies (SOES) is studying in detail *only one block* out of 55 arsenic affected blocks of 7 districts. The study is made on the anticipation that the results of a detailed study in one block may permit extrapolation of the situation of other blocks. Some blocks according to our survey report are known as seriously affected, like Domkal in Murshidabad, Kaliachalk in Malda and some blocks not so much affected as Baruipur and Sonarpur in South 24-Parganas and moderately affected are some blocks as Basirhat I, Deganga of North 24-Parganas. We have chosen Deganga block for a detailed study. Table 1 summarizes a detailed survey report of Deganga block for a two-year period.