TABLE I

Effects of Simazine on DNA, RNA and total nitrogen of peas

	DNA μg/g[a,b]	% increase	RNA μg/g[a,b]	% increase	Total nitrogen[a,b] mg/gm	% increase
Control	11·0	..	147·3	..	46·5	..
Low dosage (0·02 lb/acre)	12·2	11·1	181·2	23·0	53·0	14·0
Medium dosage (·10 lb/acre)	15·3	39·0	193·7	31·5	58·1	24·9
High dosage (·50 lb/acre)	12·7	15·0	161·7	9·8	49·0	5·3

a Average of four replicates per treatment.
b Results expressed on dry weight basis.

lb/acre treatment. At the higher doses, however, the increase in the total nitrogen was less. It is not known whether Simazine had a direct effect, but certainly the increase in total nitrogen cannot be attributed to supplemental nitrogen fertilization as reported for wheat[5]. This is especially true since peas, which are legumes, do not require supplemental nitrogen fertilization for maximum yield for commercial culture of peas on the optimal soil fertility.

To determine whether other constituents in the seeds were influenced by the Simazine treatment and whether they could be responsible for the increase in total nitrogen, we looked to nucleic acids. The RNA content of the seeds (Table I) corresponded closely with the increase in total nitrogen. This indicates that the increase in total nitrogen is RNA-dependent and may occur in the form of organic nitrogen such as protein, as reported by earlier workers[6]. The DNA increase noted in this experiment may possibly be explained on the basis of an enhanced cell division in treated plants, which in turn could induce the RNA-dependent increase in the total nitrogen.

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SCREENING BREAD WHEAT GERMPLASM FOR GRAIN PROTEIN CONTENT AND GLUTEN STRENGTH

THE indigenous tall Indian wheat varieties and the semi-dwarf germplasm imported from CIMMYT have a low Pelshenke value (less than 150 minutes)[1]. On the contrary, the hard red winter wheats exported from the U.S.A., Australia, Canada, etc., normally belong to a strong and very strong flour categories and are ideally suited for making quality bread. In order to improve the quality of local germplasm a few high quality winter and spring wheat varieties (Chris, Crim, Selkirk, Scout, Gage, Justin, Sage, Homestead, Sentinel, Olaf and Eova) were imported from Nebraska (U.S.A.) during 1968–69 and hybridized at Gurdaspur with the local and Mexican germplasm.

Spectacular results have been achieved during the last ten years. Two hundred phenotypically uniform progenies were bulked during 1978–79 at the Regional Research Station, Gurdaspur. These progenies were grown under high fertility irrigated condition (N, P_2O_5 and K_2O were applied @ 120, 60 and 30 kg/ha respectively). Composite samples of each variety were drawn and evaluated for grain protein content and Pelshenke value.

Variation for grain protein content ranged from 10·4 to 13·8%. Two standard wheat varieties, WG 357 and C 305 when raised under similar conditions had a mean grain protein content of 12·5 and 10·8% respectively. Seventeen wheat varieties had a grain protein content higher than WG 357. Six wheat varieties (WG 2194, WG 2'8?, WG 2080, WG 2100, WG 2036 and WG 2032) exhibited a protein content higher than 13·0%. These six varieties might be used as donors for high grain protein content.

Variation for Pelshenke value ranged from 61 to 250 minutes. Twenty wheat varieties had a Pelshenke value higher than 200 minutes. Nine varieties exhibited a Pelshenke value higher than 150 minutes and four had a range of 100 to 150 minutes.

Wheat variety WG 2080 had a Pelshenke value of 222 minutes and protein content 13·1%. It has the same height as WG 357 but nine days earlier in anthesis than the latter. Three other wheat varieties, namely, WG 2122, WG 2085 and WG 2142 which had a protein content higher than WG 357 belonged to a very strong dough category. These four wheat varieties would be useful parents in the hybridization programme for ameliorating Pelshenke value and grain protein content.

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STUDIES ON SILKWORM DISEASES

Phage and Serotyping of *Bacillus thuringiensis* Strains Occurring in the Sericultural Tracts of Karnataka

Bacillus thuringiensis is a well-known pathogen on lepidopterous and to a lesser extent on other insects. The mulberry silkworm *Bombyx mori* is among the more susceptible insects to the bacterium. At the same time *B. thuringiensis* preparations have enormous potential as a microbial insecticide for pest control. Thus there may exist conflicting interests in the use of *B. thuringiensis* preparations in intensive sericultural tracts and several studies must be carried out before these preparations can be considered safe for use in sericultural areas.

As a part of our investigations on the diseases of silkworms, several *Bacillus* strains were isolated from dead silkworms, excreta, rearing room dust, mulberry garden soil, etc., and purified by the usual methods. The H-antigens of, and antisera against authentic serotypes as well as the local isolates were prepared as per the procedures suggested by Norris[1]. Agglutination was checked in tubes.

Bacteriophages capable of lysing *B. thuringiensis* were also isolated from mulberry garden soil. A number of strains were used as hosts and phages from lytic regions were picked and purified by routine phage techniques. Three strains (labelled as VTP1, VTP2, and VTP3) were selected for the detailed studies on host-parasite interactions and these were used for testing the sensitivity of different *Bacillus thuringiensis* strains. Phage sensitivity was checked by preparing a lawn of the host strain and spotting a small droplet of phage preparation.

Bacillus thuringiensis strains were first isolated from a serious epizootic in Devanhalli area. Tables I and II give the details regarding the incidence of *Bacillus thuringiensis* from different materials and the frequency of incidence of different serotypes. These

TABLE I

Bacillus *species from sericultural areas*

Source	Number of isolates		Total
	Crystal forming	Non-crystal forming	
Soil	4	4	8
Leaf	3	6	9
Rearing room dust	2	2	4
Silkworm larvae	17	9	26
Egg sheet	1	1	2
Tray litter	1	2	3
Total	28	24	52

TABLE II

Frequency of incidence of different serotypes of Bacillus thuringiensis

Serotype	Number of strains out of 20 strains*
H_1 Berliner	2
H_3 Alesti/Kurstaki	2
H_4 Sotto/Dendrolimus/Kenyae	7
H_5 Galleriae/Canadensis	2
H_6 Entomocidus	1
H_7 Aizawae	1
H_8 Morrisoni	3
Unknown	2**

* Some more strains are to be typed. These may be mostly H_4.

** These two though crystal forming did not cross react with any of the antisera we have prepared.