PHYTOCHLORE STABILITY AS SELECTION INDEX IN *BRASSICA* BREEDING

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ABSTRACT

Of all the physiological processes - PHOTOSYNTHESIS is the heart of one of the most vital functions, which in turn, is drastically influenced by unaccountable external and internal factors. Researches emphasise the part played by phytochlore in plant metabolism.

Present investigation is designed to elucidate our understanding of the relation of phytochlore stability in different genetic materials from India and European junceaes. Mutant derivatives of Indian mustard, RLM-198 recorded highest stability, followed by RC-781 and RLM-514. Among exotic strains from Europe, EJ-11 has stable performance. Intermediate stability was observed in EJ-21, 2 and 29. Pusa Bold, an indigenous variety was most unstable of all genotypes.

Physico-chemical heterogeneity of phytochlore is exhibited in its metabolism. The newly synthesized molecules are first incorporated in that form which is more readily extracted by apolar solvents, thereby having higher specific activity and hence less stable. This arises due to variation in variously aged molecules residing within chloroplast. It was our prime aim to investigate stability of such form under varying genetic backgrounds, and to standardize an appropriate strategic stage and state for using phytochlore stability as an index attributing physiological efficiency in *Brassica* breeding programs.

INTRODUCTION

In plant metabolism the part played by chl can be viewed from two angles. One as a driving force of photosynthesis and the other as a component of the living tissue, a metabolite and product of a certain biochemical pathway. One of the principal functions of chlorophyll is the accumulation of pigment during the greening of young leaves. In the fall, the chl. is broken down and converted into other compounds in the process of degreening. The question being whether these processes do answer all the alterations occurring by chl. at a given time ? One could speculate that synthesis and degradation occur simultaneously. Pre-dominance of one or the other would result in increase or decrease of the total conc. of pigment, and equal rates of synthesis and degradation would correspond to a constant conc. of pigment. In the present paper we propose to focus on its stability over a given period of time in genetically divergent populations and standardize it as a possible selection criterion in Brassica breeding programs.

MATERIALS AND METHODS

Experiment was conducted on ten different diverse genotypes from Indian and European Brassica materials developed through both conventional (Introduction and Hybridization) and non-conventional breeding (mutation) procedures. Indian materials were RLM-198, RLM-514, RC-781 and Pusabold, the European ones comprised of EJ2, 11, 21, 22, 23 and 29.

Phytochlore 'a' and 'b' was estimated according to Neill and Cress (1980) and for stability the material after developing color and recording initial reading (at 0 hours) was kept in refrigerator as such and the subsequent readings were recorded at 24 hours and 48 hours.

RESULTS

Data represent that phytochlore a and b were much higher in vegetative phase in RLM-198, 514 and RC 781. These followed by EJ 11, 21 and 23 in intermediate category and of all the lowest amounts and instable was the Pusabold variety. Same trend was not however observed during sampling at reproductive phase, where only RC 781 among indigenous had high value and relatively stable performance. In this phase of phytogrowth European Junceaes 2, 22, 21 and 11 in order of amounts were higher and the RLM-198 and 514 exhibited the reverse stature by having lowest values. Color disintegration was gradual and steady in phytochlore 'a' rather than that of 'b'. In both the phases of investigation and in almost all the genotypes these observed a rapid decline in readings at 24 hours and the difference of decline between 24 and 48 hours was however so to remarkable extent.

DISCUSSION

The appreciable variation in phytochlore amount and in particular its stability performance is attributed to the physicochemical heterogeneity of chlorophyll metabolism. The newly synthesized molecules are primarily incorporated in the form that is readily extracted by apolar solvents. Hence this form of phytochlore is relatively unstable. Reports state that the rate of hydrolysis of phytochlore a is not higher than that of phytochlore b, on the contrary, the rate of hydrolysis of both pigments is practically the same. The variation is therefore attributed not to the chemical reactivity of each pigment, but the spatial relationships between chlorophyllase and the pigments.

Increased amounts of phytochlore amounts during vegetative phase reflects also the efficient conversion of solar energy into chemical energy which eventually leads to accumulation of source and the decline in amount of phytochlore during reproductive phase is accounted to (i) efficient transport of source to sink (ii) senescence mechanism in the plant.

Plant breeding in its changing context has to view through biochemical and plant physiological basis for yield enhancement ; for which an efficient selection criterion is essential obviously. We hereby emphasize the estimation of phytochlore and its stability, particularly at 24 hours period to be appropriate and easy to screen efficient genotypes as converters of solar to chemical energy.

REFERENCES

NEILL and CRESS (1980). Analyst.

SHLYK, A.A. (1970) Chlorophyll metabolism in green plants. Israel Prog. Sci. Trans. Jerusalem. pp. 293.

	PHYTOCHLORE "a" (cpm/ug C)						PHYTOCHLORE 'b' (cpm/ug C)					
	0 Hr.		24 Hr.		48 Hr.		0 Hr.		24 Hr.		48 Hr.	
	V	R	V	R	V	R	V	R	V	R	V	R
RLM 198	20.3	5.4	18.0	4.8	18.0	4.8	12.6	4.3	11.7	4.3	10.8	4.1
RLM 514	17.1	7.4	17.5	7.4	16.7	7.0	11.2	8.0	10.4	8.0	8.4	6.8
RC 781	18.0	19.9	18.0	18.8	18.0	18.5	11.7	11.3	10.8	11.3	7.3	12.9
Pusa Bold	5.5	11.7	4.8	10.7	3.9	10.7	6.7	8.3	8.3	8.3	3.3	7.4
EJ No. 2	13.0	29.0	11.7	26.6	13.5	25.7	9.2	21.7	8.8	21.7	7.9	21.2
EJ 11	16.2	18.8	16.9	12.5	18.0	11.9	11.8	9.6	10.6	9.6	8.2	6.2
EJ 21	15.1	19.5	16.0	18.5	16.0	18.0	11.9	22.6	10.4	22.6	8.1	18.0
EJ 22	10.8	24.5	10.9	22.1	10.0	21.3	7.4	19.0	7.1	19.0	6.4	17.5
EJ 23	12.9	14.2	11.9	12.3	9.7	11.9	10.0	11.4	7.7	11.4	6.3	9.6
EJ 29	12.1	11.6	10.6	10.3	10.4	9.8	8.6	9.4	8.3	9.4	6.6	7.7

V = Vegetative phase
R = Reproductive phase