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D E C I S I O N
of 13 July 1999

Case Number: T 1051/96 - 3.3.4

Application Number: 89903396.3

Publication Number: 0402401

IPC: C12N 15/00

Language of the proceedings: EN

Title of invention:
Genetic linkages between agronomically important genes and restriction fragment length polymorphisms

Applicant:
PIONEER HI-BRED INTERNATIONAL, INC.

Opponent:
-

Headword:
Genetic linkages/PIONEER

Relevant legal provisions:
EPC Art. 56, 96
EPC R. 86(3)

Keyword:
"Main request - not admitted"
"First auxiliary request - inventive step (no)"
"Second auxiliary request - inventive step (no)"

Decisions cited:
T 0063/86, T 0099/85, G 0010/93

Catchword:

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1051/96 - 3.3.4

D E C I S I O N
of the Technical Board of Appeal 3.3.4
of 13 July 1999

Appellant: (Applicant)
PIONEER HI-BRED INTERNATIONAL, INC.
700 Capital Square
400 Locust Street
Des Moines
Iowa 50309 (US)

Representative:
Chapman, Paul W.
Kilburn & Strode
20 Red Lion Street
London WC1R 4PJ (GB)

Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 24 June 1996 refusing European patent application No. 89 903 396.3 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: U. M. Kinkeldey
Members: L. Galligani
S. C. Perryman

Summary of Facts and Submissions

I. The appeal was lodged by the applicants against the decision of the examining division dated 24 June 1996 whereby the European patent application No. 89 903 396.3, published as International application WO 89/07647, was refused according to Article 97(1) EPC. Basis of the decision were claims 1 to 7 filed on 31 October 1995.

Claim 1, 6 and 7 read as follows:

"1. A method of determining a correlation between a phenotypic trait in maize and a restriction fragment length polymorphism [*RFLP*] comprising:

(a) digesting genomic DNA from a maize plant with a restriction endonuclease that produces a restriction fragment length polymorphism digestion pattern that is associated with said trait;

(b) separating the fragments obtained from said digestion in step (a);

(c) detecting said restriction fragment length polymorphism with a hybridization probe containing sequence information capable of hybridizing to and identifying said RFLP, thereby generating a restriction pattern; and

(d) correlating the presence or absence of said RFLP in said digest with the respective presence or absence of said trait;

wherein said trait is yield."

"6. A method for identifying individual maize plants which have the desired genotype of at least one genetic marker locus associated with a desired quantitative trait, comprising the steps of:

constructing a preferred RFLP profile for each selected genetic marker associated with the desired trait;

determining the RFLP profiles of individual plants in a segregating population of plants versus the selected genetic markers; and

selecting individual plants which have RFLP profiles which most closely match the preferred RFLP profile;

wherein said trait is yield."

"7. A method according to claim 6 for identifying individual maize plants which have the desired genotype at a genetic marker locus associated in the inbred performance with a trait identified in the following table, the method comprising the steps of:

constructing a preferred RFLP profile with respect to one or more of the genetic markers listed in the following table under the heading of the said trait;

[*Table reported*]

determining the RFLP profile of individual plants

in a segregating population of plants versus the one or more genetic markers; and

selecting individual plants which have RFLP profiles which most closely match the preferred profile."

Claims 2 to 4 concerned particular embodiments of the method according to claim 1. Independent claim 5 was directed to a method for identifying and mapping quantitative trait loci (QTL) for a phenotypic trait in specific maize plants, the phenotypic trait being "yield".

Claim 1 as originally filed did not contain a limitation to any specific trait. The limitation to **yield** had been introduced during examination before the first instance in order to meet a non-unity objection which had been repeatedly raised under Article 82 EPC.

II. The examining division considered that the subject-matter of claims 1 to 6 did not meet the requirements of Articles 56 and 84 EPC. Reference was made in the decision to the following prior art documents:

(7) Helentjaris T., TIG, August 1987, Vol. 3, No. 8, pages 217 to 221

(8) Quantitative Genetics in Maize Breeding, A. R. Hallauer and J. B. Miranda, Fo., Iowa State University Press, 1981, page 116.

The examining division held that, as document (7) described the use of the correlation between the

restriction fragment length polymorphism (RFLP) and any desired trait, including a "complex" trait, ie a trait with low heritability, the application of this known approach to the trait "yield" did not involve an inventive step. Claim 1 as well as claims 2 to 6 were in any case considered to be merely the paraphrase of the problem of finding a correlation between a quantitative trait and RFLP, and to lack the features which were necessary to solve the said problem.

III. With the statement of grounds of appeal, the appellants filed a new main request and two auxiliary requests.

The **main request** consisted of claims 1 to 7 which differed from the claims refused by the examining division in that they stated that the selected trait could be, in addition to "yield", also "ear circumference, ear diameter, ear length, cob circumference, cob diameter, kernel row length and kernel depth".

The **first auxiliary request** consisted of claims 1 to 7 identical to claims 1 to 7 of the claim request refused by the examining division.

The **second auxiliary request** consisted of claims 1 and 2, of which claim 1 was the combination of claims 6 and 7 as refused by the examining division. Dependent claim 2 specified the maize plant.

IV. On 17 February 1999 the board issued a communication pursuant to Article 11(2) of the rules of procedure of the board of appeal with a provisional, non-binding opinion on the matters at issue. In this communication,

in addition to a reference to document (7), the following documents were cited:

(3) Nienhuis J. et al., Crop Sci., 1987, Vol. 27, pages 797 to 803;

(4) Stuber C. W. et al., Crop Sci., 1987, Vol. 27, pages 639 to 648.

V. Oral proceedings, which had been requested by the appellants in case the board should not be inclined to grant a patent on the basis of the main request, were scheduled to take place on 13 July 1999.

VI. On 1 July 1999 the appellants informed the board that they would not attend the oral proceedings. These took place on 13 July 1999. The appellants did not appear.

VII. The appellants submitted in writing that, as there was no suggestion in the prior art of a correlation between RFLP and low heritability traits, such as eg yield, the claimed method was inventive. The problem to be solved was that of predicting whether hybrid plants were likely to express complex traits such as high yield, ear circumference and ear diameter etc, ie traits of low heritability. The appellants had found that these traits could be correlated with RFLPs. Document (7) established a correlation between RFLPs and traits such as plant height which were **not** low heritability traits. Nothing in this documents pointed to the trait "yield" and there was no reasonable expectation that the correlation of RFLPs with a low heritability trait would be successful. For this reason, the main request had now been extended to include, in addition to

"yield", other low heritability traits (cf document (8)). In view of the contribution to the art, a fair level of protection could only be obtained if broader claims were to be granted.

It was observed that the examining division had not used correctly the problem-solution approach in their analysis of inventive step as, in formulating the problem, the solution was anticipated (cf decision T 99/85 OJ EPO 1987, 413). They had wrongly regarded the several traits listed in the patent application as being all equivalent alternatives, which was not true. The invention lay in the selection of a particular approach (correlation with complex traits) from among various alternatives.

As for the Article 84 EPC objection, if it was accepted that the appellants had made the inventive connection between low heritability traits and RFLPs, the steps set out in the claims defined precisely the invention.

If the broader outline of the claims was considered not to be inventive, it was certainly inventive to correlate "yield" with an RFLP (first auxiliary request) or to provide a set of QTLs which could be used in the correlation (second auxiliary request).

VIII. The appellants requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request, or in the alternative, on the basis of the first or second auxiliary request.

Reasons for the Decision

Main request

1. The appellants put forward on appeal this request because they considered that, as the contribution to the art by their application was the finding of a connection between low heritability traits and RFLPs, they were entitled to claims covering, in addition to the embodiment related to the trait "yield", also a number of other low heritability traits (cf Section VII supra). An identical request had already been put forward during examination before the first instance on 6 March 1995 (cf. also letter filed on 3 November 1994). This request had then been replaced by the appellants on 31 October 1995 with a request restricted to the trait "yield" in response to the examining division's objections (cf Section I supra).

2. Thus, the appellants have now reintroduced on appeal matter which, having been objected to under Article 82 EPC by the examining division, had not been further prosecuted by them. In the board's judgement, admission of this request into the proceedings should be refused in the exercise of the board's discretion under Rule 86(3) EPC (cf decision T 63/86, OJ EPO 1988, 224). This is because, as is clear from the European Patent Convention, in particular Article 96 EPC, and has been stated in point 4 of the Enlarged Board of Appeal decision G 10/93 (OJ EPO 1995, 172), it is the task of the examination division, and not that of the appeal board, to carry out a full examination as to

patentability requirements. Proceedings before the boards of appeal in ex parte are primarily concerned with examining the contested decision. Therefore, where an applicant has avoided an objection of non-unity from the examination division by restricting a broad claim to avoid the objection, the applicant cannot be allowed on appeal from a decision refusing the restricted claim on some other ground, such as here lack of inventive step, to put forward a request which reverts to the broader claim and thus re-introduces matter open to the objection of lack of unity.

To allow an applicant to do this would face the board of appeal with the choice of either having to consider the question of non-unity without the benefit of a reasoned decision by the examining division on this point, or of lengthening the proceedings by remitting the case for the examining division to decide on non-unity. Neither possibility is acceptable. Rather an applicant faced with an objection of non-unity must obtain an appealable decision on the point, possibly by putting forward to the examining division both a main request with the broad claim and an auxiliary request to the restricted claim, if he wishes the board of appeal later to consider the issue. This should not cause the examining division much extra work if they have complied with Rule 51(3) EPC which requires that the communication pursuant to Article 96(2) EPC contain a reasoned statement covering, where appropriate, all the grounds against the grant of the European patent. If the applicant chooses to avoid having a decision on non-unity from the examining division, he must content himself with the possibility of filing divisional applications: he cannot have the question of non-unity

re-opened on appeal.

First auxiliary request

3. This request is identical to the claim request rejected by the examining division. It has thus to be decided whether the arguments put forward by the appellants are sufficiently convincing to refute the reasons given in the decision under appeal so as to lead to its being set aside.

4. The board agrees that document (7) represents the most appropriate starting point for an inventive step analysis. This document describes the application of the correlation between a given phenotypic trait of maize plants and RFLPs in genetic analysis of maize. The document indicates that this can be used to determine the location of a quantitative trait locus and evaluate its relative effect upon the overall variance for a complex trait, and characterise its gene action as being additive or dominant/recessive. In particular, the correlation of plant height with RFLPs is described (cf Fig. 4).

5. The board agrees with the appellants that in order to assess inventive step, the technical problem must be so formulated as not to contain pointers to the solution (cf T 99/85, supra). In the present case, the problem is defined as finding a way to predict whether a locus associated with the trait "yield" is likely to be present and thus expressed in individual maize plants. The solution proposed is based on the determination of its correlation with RFLPs (cf in particular claims 1 and 6).

6. In the appellants' view, the inventive step lies in the unexpected realisation that a low heritability trait such as yield can be correlated with RFLPs. However, the board does not share this view for the following reasons:

(a) The use of molecular markers like isozymes and RFLPs for investigations of quantitative trait loci (QTL) in maize plants was known in the art. Document (4), for example, described the use of isozyme markers to locate QTLs associated with grain **yield** and 24 **yield-**related traits in maize plants. Document (7), as already stated, described the application of the correlation between a given phenotypic trait of maize plants and RFLPs.

(b) The use of RFLPs as a selection criterion for traits with low heritabilities in tomato plants was described in document (3).

(c) Thus, there was a broad hint in this prior art to study the correlation between RFLPs and the quantitative trait of "yield" in maize plants. Yield being an agronomically important trait of maize plants (cf document (4)), the skilled person had every motivation for trying to establish such a correlation according to the approach described in document (7) and would also have had a reasonable expectation of success.

7. For these reasons, the board cannot accept that the methods outlined in general terms which form the subject-matter of the claims at issue, in particular of

claims 1 and 6, constitute an inventive selection from among various alternatives. Rather, the board considers that the claimed methods would have been derived in an obvious manner from the prior art by a skilled person. Consequently, this request is refused under Article 56 EPC.

Second auxiliary request

8. This request contains a limitation to the use in the claimed method of a list of specific genetic markers which are admittedly known and available in the art (cf page 12 of the application). In the board's judgement, the use of known molecular probes to identify QTLs within the framework of a non-inventive general method (cf points 6 and 7 supra) was for the skilled person merely a matter of routine optimisation and would have been derived by him or her from the prior art in an obvious manner. Consequently, an inventive step cannot be acknowledged, and the second auxiliary request also is refused under Article 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar The Chairperson:

U. Bultmann U. M. Kinkeldey