Ίδρυμα Λαονα
Για την Αναβίωση και Προστασία της Κυπριακής Υπαίθρου

Laona Foundation
For the Conservation and Regeneration of the Cypriot Countryside

TERRA CYPRIA

GENETICALLY MODIFIED ORGANISMS: WHERE ARE WE NOW, IN EUROPE AND IN CYPRUS?

ΠΟΥ ΒΡΙΣΚΕΤΑΙ ΣΗΜΕΡΑ ΤΟ ΘΕΜΑ ΤΩΝ ΓΕΝΕΤΙΚΑ ΤΡΟΠΟΠΟΙΗΜΕΝΩΝ ΟΡΓΑΝΙΣΜΩΝ ΣΤΗΝ ΕΥΡΩΠΗ ΚΑΙ ΣΤΗΝ ΚΥΠΡΟ;

Αγγλικό κείμενο με συνοπτικές εκθέσεις
στα ελληνικά και αγγλικά.

A desk study jointly commissioned by the

Laona Foundation for the Regeneration of Cypriot Countryside and

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Συνοπτική Έκθεση

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Η μελέτη αυτή εξετάζει διάφορα θέματα/ερωτήματα που εγείρονται σε σχέση με τους γενετικά τροποποιημένους οργανισμούς (ΓΤΟ), με στόχο ν' αξιολογήσει κατά πόσο οι θέσεις των αδελφών μη κυβερνητικών οργανώσεων Terra Cypria και Ίδρυμα Λαόνα, εξακολουθούν να είναι βάσιμες. Μέχρι στιγμής οι δύο οργανώσεις έχουν τοποθετηθεί ενάντια στην εισαγωγή και χρήση ΓΤΟ στη χώρα μας για διάφορους λόγους που περιλαμβάνουν: το μικρό μέγεθος του αγροτικού κλήρου και τον συνεπαγόμενο κίνδυνο επιμόλυνσης αγρών από γειτονικά χωράφια καλλιεργημένα με ΓΤ είδη· τον μεγάλο πλούτο ενδημικών ειδών στη χώρα μας που πιθανόν να εκτεθούν σε κίνδυνο από ΓΤ είδη· το γεγονός ότι ως κράτος δεν διαθέτουμε ακόμα την υποδομή για τους απαραίτητους ελέγχους και παρακολούθηση ΓΤ ειδών, καθώς επίσης, την ανάγκη να εφαρμόσουμε την αρχή της συνετής πρόληψης, ενόψει των πολλών άγνωστων πτυχών που αφορούν τους ΓΤΟ.

Τα ερωτήματα που τέθηκαν προς εξέταση από τη μελέτη, καθώς και οι συνοπτικές απαντήσεις δίνονται παρακάτω:

1. **Γιατί φοβούμαστε τους ΓΤΟ; Υπάρχουν τεκμηριωμένες αλλαγές σε ανθρώπους, ζώα ή φυτά από την επίδρασή τους;**
   Η ανησυχία για τους ΓΤΟ αφορά σε δύο κυρίως μορφές τους: (α) τη χρήση ΓΤ ουσιών σε επεξεργασμένες ή προπαρασκευασμένες τροφές (λ.χ σοκολάτες) και (β) τη χρήση ΓΤ σπόρων σε καλλιέργειες. Υπάρχει και μια τρίτη μορφή, η χρήση ΓΤ ουσιών σε ζωοτροφές.

   Το Μέρος 1 εξετάζει κινδύνους σχετιζόμενους με την εμφάνιση καρκίνων (από την εισαγωγή γονιδίων που οδηγούν σε μεταλλάξεις στο είδος-δέκτη), με την ανάπτυξη αλλεργιών, πορίσματα από δοκιμές σε ποντίκες, έντομα και φυτά από την μεταφορά γενετικού υλικού.

   Το συμπέρασμα μας είναι ότι δεν υπάρχει τελεσίδικη απόδειξη αν τα ΓΤ τρόφιμα είναι επικίνδυνα ή όχι. Γι αυτό θα πρέπει να εφαρμόσουμε την αρχή της συνετής πρόληψης και ν' αποκλείσουμε την εισαγωγή ΓΤ σπόρων, και ει δυνατόν, τροφίμων μέχρι να υπάρξουν αδιαμφισβήτητα δεδομένα ότι είναι ακίνδυνα.

2. **Ποια είναι η θέση της ΕΕ απέναντι στους ΓΤΟ; Υπάρχουν σπόροι/τρόφιμα που προωθούνται από την Κομισιόν, κι αν ναι, για ποιους λόγους;**
   Στο Μέρος 2 επεξηγείται γιατί κάποιες Ευρωπαϊκές χώρες θεωρούν αποδεκτούς ή και ωφέλιμους ακόμα τους ΓΤΟ σε βαθμό που να δικαιολογείται η έγκριση τους. Περισσότερα στοιχεία για την τοποθέτηση εκείνων που δέχονται τους ΓΤΟ δίδονται στο Μέρος 5.1 (δέστε θέσεις της ELO, Ενωσης Ευρωπαίων Γαιοκτημόνων και Δασοκτημόνων), καθώς και στο Παράρτημα (Μέρος 2). Εξηγείται επίσης ότι η ΕΕ δεν προωθεί οποιαδήποτε προϊόντα, αλλά εξετάζει, σύμφωνα με τις κοινοτικές διαδικασίες, αιτήσεις που υποβάλλονται από τις κατασκευάστριες εταιρείες των ΓΤ ειδών, και αποδέχεται αιτήσεις που συνάδουν με τα θέσμιά της.

   Η Ευρωπαϊκή θέση που εκφράζεται μέσα από τις σχετικές Κοινοτικές Οδηγίες (Directives) και Κανονισμούς (Regulations) είναι ότι θεωρούνται ασφαλή τα 18 ΓΤ προϊόντα που ήδη εγκρίθηκαν. Η Κοινότητα αποφάσισε επίσης ότι τρόφιμα που περιέχουν ποσοστό ΓΤΟ μέχρι 0.9%, δηλαδή κάτω από 1% είναι ασφαλή για κατανάλωση, πρέπει όμως να φέρουν την κατάλληλη σήμανση.

Μολονότι θα μπορούσε να λεχθεί ότι η κοινοτική νομοθεσία ανταποκρίνεται περισσότερο στις πιέσεις που προέρχονται από τον Παγκόσμιο Οργανισμό Εμπορίου (World Trade Organisation), παρά στην κοινή γνώμη των πολιτών της (Μέρος 2, 3 και 4), παραμένει γεγονός ότι η κοινοτική νομοθεσία είναι συγκριτικά αυστηρή. Παρά ταύτα, ορισμένα κράτη-μέλη δεν συμφωνούν με την Κοινοτική νομοθεσία κι έχουν πάρει μέτρα προς αποκλεισμό των ΓΤΟ στη χώρα τους, είτε σε εθνικό ή σε περιφερειακό επίπεδο. Μέχρι στιγμής η ΕΕ δεν εξασφάλισε την πλειοψηφία που χρειάζεται για να υποχρεώσει τα κράτη αυτά να συμμορφωθούν με τις κοινοτικές αποφάσεις (Μέρος 7).

3. **Ποια είναι η θέση της Ευρωπαϊκής Γενικής Διεύθυνσης Περιβάλλοντος;**
Μολονότι καμμιά Γενική Διεύθυνση δεν μπορεί να διαφέρει από την γενική τοποθέτηση της κοινότητας και της Κομισιόν, ο τρόπος αντιμετώπισης επί μέρους θεμάτων μπορεί να διαφέρει. Λ.χ η Γενική Διεύθυνση Εμπορίου και Ανάπτυξης Ανταγωνισμού φαίνεται πιο έτοιμη για την καθιέρωση των αποστάσεων ασφάλειας μεταξύ αγροτεμαχίων (το λεγόμενο 'co-existance'). Αντίθετα ο Επίτροπος Περιβάλλοντος, κ. Σταύρος Δήμας, έχει εκφράσει τις επιφυλάξεις του υπογραμμίζοντας ότι χρειάζεται ανεξάρτητη επιστημονική τεκμηρίωση πριν εγκριθούν οποιαδήποτε ΓΤ είδη, δεδομένου ότι οι έλεγχοι που διεξάγονται τώρα από το αρμόδιο Ευρωπαϊκό όργανο βασίζονται κατά κύριο λόγο σε στοιχεία που παρέχουν οι κατασκευάστριες εταιρείες (Μέρος 3).

4. **Ποια είναι η θέση του Ευρωπαϊκού Κοινοβουλίου απέναντι στους ΓΤΟ;**
Το Μέρος 4 παραθέτει κατάλογο της νομοθεσίας που έχει εγκρίνει το Κοινοβούλιο και εξετάζει τις τοποθετήσεις διαφόρων Ευρωβουλευτών, οι οποίες, όπως φαίνεται, είναι μοιρασμένες υπέρ και κατά των ΓΤΟ. Γεγονός παραμένει ότι η Ευρωπαϊκή Πολιτική επιδιώκει να παραμείνει εύρωστη η Ευρωπαϊκή γεωργία και η σώφρων χρήση ΓΤΟ θεωρείται ''ένα από τα εργαλεία προς την κατεύθυνση αυτή''.

5. **Πως τοποθετούνται άλλοι ενδιαφερόμενοι (stakeholders);**
Το Μέρος 5 εξετάζει τις τοποθετήσεις άλλων ενδιαφερομένων συνόλων όπως είναι:
   - Η Ένωση Ευρωπαίων Γαιοκτημόνων (ELO) που υποστηρίζει την βιοτεχνολογική πρόοδο και, κατά συνέπεια, τη χρήση ΓΤ σπόρων στις καλλιέργειες (αφού βεβαίως ληφθούν τ' απαραίτητα μέτρα προφύλαξης).
   - Οι κύριες πανευρωπαϊκες ΜΚΟ (όπως Φίλοι της Γης, WWF, κλπ.) που είναι κάθετα εναντίον, βασίζουν τη θέση τους στους κινδύνους που εγκυμονεί αυτή η τεχνολογία.

Στο ίδιο Μέρος εξετάζεται και η περίφημη δικαστική υπόθεση της Monsanto v. Schmeiser (2004) που έλαβε χώρα στον Καναδά κι αφορά την επιμόλυνση από ΓΤ προϊόν της Εταιρείας Monsanto μεγάλων γεωργικών εκτάσεων που καλλιεργούσε ο Schmeiser. Στην περίπτωση αυτή η Monsanto ενήγαγε τον Schmeiser για άνευ αδείας υποκλοπή και χρήση του πατενταρισμένου ΓΤ σπόρου της. Με άλλα λόγια δεν έφτανε που επιμολύνθηκε η σοδειά και τα χωράφια του Schmeiser, κατηγορήθηκε και για κλοπή πατέντας.

6. **Ποια άποψη επικρατεί στο Ευρωπαϊκό κοινό;**
Η κοινή γνώμη για το θέμα εξετάζεται στο Μέρος 6, με βάση τα πορίσματα του Ευρωβαρόμετρου, σε επίπεδο κοινότητας, κράτους-μέλους και Κύπρου. Η Ευρωπαϊκή κοινή γνώμη σαφώς αντιτίθεται στους ΓΤΟ, με ιδιαίτερη βαρύτητα στην Ελλάδα. Στην Κύπρο, έστω κι αν υπάρχει κάποια άποψη ότι ο δημόσιος διάλογος δεν ήταν αρκούντως αντικειμενικός, το κοινό έχει τοποθετηθεί ενάντια στους ΓΤΟ με σχετική υποστήριξη της Βουλής.

7. **Ποιες είναι οι συνθήκες σε άλλες Ευρωπαϊκές χώρες; Ποια κράτη-μέλη υιοθέτησαν την πολιτική να είναι ελεύθερα από ΓΤΟ (GMO-free) και με ποια νομικά επιχειρήματα απέναντι στην Κομισιόν;**
Όπως ήδη αναφέρθηκε, διάφορα κράτη αρνήθηκαν να επιτρέψουν ΓΤ είδη στην επικράτεια τους και μέχρι στιγμής δεν τους επιβλήθηκαν μέτρα συμμόρφωσης.

Στο Μέρος 7 παρατίθεται πίνακας που δείχνει την παρούσα κατάσταση (κατά τον Ιούλιο 2007), σε κάθε χώρα. Ο πίνακας δείχνει ποιες χώρες ή περιφέρειες τους, δήλωσαν ότι δεν θα δεχθούν ΓΤΟ, καθώς και το νομικό υπόβαθρο πάνω στο οποίο βασίστηκαν. Πρέπει όμως να διευκρινίσουμε ότι οι απαγορεύσεις αυτές δεν έχουν πάντα αυστηρά υποχρεωτικό χαρακτήρα, αλλά βασίζονται στην καλή πρόθεση των αγροτών και γαιοκτημόνων για να παραμείνει σε ισχύ η απαγόρευση.

Προς το παρόν υπάρχουν τρία κράτη της ΕΕ ελεύθερα από ΓΤΟ: η Ελλάδα, η Αυστρία και η Πολωνία. Το Μέρος αυτό εξετάζει την πορεία που ακολούθησαν. Εξετάζει επίσης την αντιμετώπιση της Μάλτας, καθώς και την πανεθνική απαγόρευση της Ουγγαρίας στην εισαγωγή του γενετικά τροποποιημένου καλαμποκιού MON 810. Ας σημειωθεί ότι στις επίσημες δηλώσεις του αρμόδιου κύπριου Υπουργού (Γεωργίας) προς την ΕΕ, η Κύπρος έχει τηρήσει πάντα επιφυλακτική στάση έναντι στους ΓΤΟ και είναι η πρώτη χώρα που απαγόρευσε την καλλιέργεια τους σε περιοχές του ‘’Δικτύου Natura 2000’’.

Συμπεράσματα
Εξακολουθεί να υπάρχει ακόμα πολλή αβεβαιότητα για το όλο θέμα των ΓΤΟ. Στο μέρος 8 η μελέτη μας συνοψίζει τις αβεβαιότητες από επιστημονικής και βιοηθικής σκοπιάς, καθώς και τις σύγχρονες τάσεις. Δεν είναι ίσως ρεαλιστικό ν’ αναμένουμε ότι μπορούμε να εμποδίσουμε την εισαγωγή ξένων τροφίμων που περιέχουν ΓΤ είδη. Μπορούμε όμως να επιμείνουμε σε επαρκή σήμανση τους, και η σήμανση περιλαμβάνει την τοποθέτηση τους σε ξεχωριστά ράφια. Όμως η εισαγωγή και καλλιέργεια ΓΤ γεωργικών προϊόντων είναι κάτι άλλο: σε μια χώρα με το μικρό μέγεθος της Κύπρου θα ήταν αδύνατο να συγκρατηθούν καλλιέργειες ΓΤ σπόρων μέσα σε συγκεκριμένα εδάφη.

Αν επιτρέψουμε ΓΤ καλλιέργειες οι πιθανές συνέπειες θα είναι ανυπολόγιστες και δεν αφορούν μόνο τους κινδύνους για τον γεωργό από περιπτώσεις όπως την Monsanto v. Schmeiser, αλλά και για το κράτος και το φορολογούμενο. Θα είναι πολύ δύσκολη η επίβλεψη και έλεγχος της χρήσης ΓΤ σπόρου και η δαπάνη ελέγχου της ατομικής γεωργικής παραγωγής θα καταστεί ασύμφορα ψηλή. Εκτός τούτου, ο εργαστηριακός έλεγχος πιθανόν ν’ απαιτεί τεχνολογία που δεν διαθέτουμε, ενώ η εξέταση αιτήσεων θα απαιτεί πολλές επιπρόσθετες ανθρωπο-ώρες. Παρά τους εμφανείς κινδύνους, πρέπει να λεχθεί ότι η απαγόρευση δεν είναι εύκολο να εγκριθεί από την Κομισιόν (δέστε τη Σημείωση 3 σχετικά με την Πολωνία στη σελ.5) και θα θέλει πολλή επιστημονική τεκμηρίωση.

Υπάρχει και ένα τρίτο αντικείμενο ενδιαφέροντος εκτός από τα ΓΤ τρόφιμα και τους ΓΤ σπόρους. Αυτό αφορά στις ζωοτροφές που παρέχονται σε κυπριακά ζώα, θέμα που αγγίζουμε ακροθιγώς στο Μέρος 1. Δεν έχουμε αμφιβολία ότι σε πλείστα κυπριακά ζώα/πουλερικά, ιδίως αυτά που εκτρέφονται μέσα σε βιομηχανικές συνθήκες, έχουν δοθεί – πριν την εφαρμογή των περιορισμών της ΕΕ - ζωοτροφές που περιέχουν ΓΤΟ. Το έργο της έρευνας και αξιολόγησης της συχνότητας, καθώς και οι δυνατότητες επιβολής ελέγχου, είναι ιδιαίτερα περίπλοκο και θα εξεταστεί σε επόμενη φάση της μελέτης μας. Αρκεί να λεχθεί ότι στο στάδιο έκδοσης του παρόντος κειμένου δεν υπάρχουν αδιαμφισβήτητα στοιχεία για τις επιπτώσεις στον ανθρώπινο οργανισμό από τη βρώση κρέατος που προέρχεται από ζώα που εκτράφηκαν με ΓΤ ζωοτροφή, όμως το όλο θέμα αποτελεί αντικείμενο ζωηρής αντιπαράθεσης στους κόλπους της ΕΕ λόγω πιέσεων από τους κατασκευαστές ζωοτροφών. Η θέση τους είναι ότι οι αυστηροί ευρωπαϊκοί περιορισμοί ως προς την περιεκτικότητα ΓΤΟ στις ζωοτροφές θα οδηγήσουν σε τέτοια έλλειψη που οι Ευρωπαίοι γεωργοί δεν θα μπορούν να διατηρήσουν τη ζωοτροφία τους. Οι ΜΚΟ θεωρούν ότι πρόκειται για υπερβολές προς δημιουργία τεχνητών συνθηκών κρίσης.

Εισηγήσεις

Ο αγώνας για την απαγόρευση ΓΤ σπόρων πρέπει να συνεχιστεί. Έχοντας υπόψη την αρχή της πρόληψης, αλλά και το γεγονός ότι η Κύπρος αποδέχτηκε το Πρωτόκολλο της Καρθαγένης για την Βιοασφάλεια, η παρούσα μελέτη εισηγείται ότι: μέχρι να υπάρξει σιγουριά ότι τα ΓΤ είδη είναι, όχι μόνο ασφαλή, αλλά καλύτερα και πιο ευεργετικά από τα καθιερωμένα φυσικά προϊόντα, η κυβέρνηση μας θα πρέπει να βρει τρόπους να εφαρμόσει μορατόριουμ στην είσοδο και χρήση ΓΤΟ.

Δεδομένου ότι οι εν δυνάμει κίνδυνοι μπορούν να προέλθουν από τρεις πηγές (τρόφιμα, ζωοτροφές, καλλιέργειες που περιέχουν ΓΤ υλικό), τα δύο Ιδρύματα που προώθησαν την εκπόνηση της παρούσας μελέτης θα πρέπει να υποστηρίξουν τις παρακάτω θέσεις:

1. Οσον αφορά προπαρασκευασμένα τρόφιμα, να παρέχεται πλήρης γνώση και επιλογή στον καταναλωτή, με εμφανή σήμανση και τοποθέτηση ΓΤ προϊόντων σε ξεχωριστά ράφια.

2. Οσον αφορά καλλιέργειες/σπόρους, να απαγορευτεί η εισαγωγή ΓΤ σπόρου, ΓΤ ακατέργαστων αγροτικών προϊόντων, να απαγορευτεί επίσης η καλλιέργεια ΓΤ σπόρων, η χρήση ΓΤΟ από επεξεργαστές τροφίμων και οι δοκιμές διαγονιδιακών αλλαγών ή ΓΤ ουσιών σε εργαστηριακά πειράματα.

3. Οσον αφορά ζωοτροφές, να παρακολουθείται στενά η κατάσταση όπως εξελίσσονται στην Ευρώπη και να μην ενθαρρυνθεί η μείωση των υφισταμένων περιορισμών μέσα από τεχνητά δημιουργημένη ζήτηση.

Η Εκθεση εισηγείται ότι τα Ιδρύματα Λαόνα και Terra Cypria πρέπει να συνεχίσουν την τοποθέτηση τους υπέρ μιας Κύπρου ελεύθερης από ΓΤΟ, προωθώντας τις ακόλουθες ενέργειες και διαβήματα από το κράτος και άλλους εμπλεκόμενους φορείς.

1. Να ενθαρρύνουν την Κυβέρνηση και τον αρμόδιο Υπουργό να συνεχίσει να προβάλλει ενστάσεις στην είσοδο ΓΤΟ, στις συναντήσεις του με το Ευρωπαϊκό Συμβούλιο Υπουργών και να επιδιώκει πιο ανεξάρτητη αξιολόγηση των ΓΤΟ που υποβάλλονται προς έγκριση.

2. Να ενθαρρύνουν τον Υπουργό να συνεργαστεί με τον Σύνδεσμο Καταναλωτών και άλλους ΜΚΟ για καθιέρωση μιας κοινά αποδεκτής πολιτικής περιλαμβανομένης μιας Συντονιστικής Επιτροπής, όπως αυτή της Μάλτας, για θέματα βιοασφάλειας. Παράλληλα οι ΜΚΟ θα ήταν φρόνιμο να συντονίσουν τις θέσεις τους και οι θέσεις αυτές να βασίζονται σε τεκμηριωμένα στοιχεία.

3. Να ενθαρρύνουν το κράτος ν' αναλάβει την εκπόνηση νομικής/επιστημονικής μελέτης σχετικά με τους λόγους που η χώρα μας πρέπει ν' απορρίψει τους ΓΤΟ, ακολουθώντας λ.χ το παράδειγμα της Ουγγαρίας.

4. Να γίνει κοινή κατατόπιση όλων των εμπλεκομένων Υπουργείων και Τμημάτων (Γεωργικό Ινστιτούτο, Υπηρεσία Περιβάλλοντος, κοκ), ώστε η Κύπρος να τηρεί ενιαία θέση στις διάφορες συσκέψεις λειτουργών που καλούνται στις Βρυξέλλες από τις διάφορες εμπλεκόμενες Γενικές Διευθύνσεις. Δεδομένου ότι η κάθε διεύθυνση διατηρεί και τις δικές της κατευθύνσεις, έστω κι αν δεσμεύεται από την κοινοτική θέση, οι κύπριοι λειτουργοί θα πρέπει να είναι όλοι ενήμεροι και να τηρούν ενιαία θέση.

5. Να ζητήσουν από το κράτος να συνεργαστεί με άλλες χώρες-μέλη που αντιτίθενται στους ΓΤΟ ώστε, σταδιακά ν' αλλάξει το κλίμα στην ΕΕ και ν' αντικατοπτρίζει καλύτερα την κοινή γνώμη, εφαρμόζοντας μεγαλύτερες προφυλάξεις και πιο ενδελεχή συστήματα ελέγχου. Να εξεταστεί ιδιαίτερα η δυνατότητα συνεργασίας με άλλες χώρες

ή περιοχές που έχουν παρόμοιο με τον δικό μας γεωργικό κλήρο μικρού μεγέθους (λ.χ Μάλτα, Μεσογειακά νησιά), ώστε ο κίνδυνος επιμόλυνσης από ΓΤ σπόρους να μπορεί να προβληθεί πολύ πιο σθεναρά. Νοείται ότι θα χρειαστεί επιστημονική τεκμηρίωση για να υποστηριχθεί ότι είναι αδύνατο να καθιερωθούν αποτελεσματικές αποστάσεις ασφαλείας σε εδαφικά περιορισμένες περιοχές.

6. Οσον αφορά τρόφιμα να συνεχίσουν να στηρίζουν την τοποθέτηση/προβολή ΓΤ προϊόντων σε χωριστά ράφια μέσω διευθέτησης που είτε θα επιβληθεί διά νόμου ή θ' αποτελεί προϊόν συνεννόησης μεταξύ καταστηματαρχών.

7. Να ενθαρρύνουν την μελέτη και παρακολούθηση αλλεργιών σε κύπριους.

Σημείωση

Μετά την συμπλήρωση της παρούσας μελέτης έλαβαν χώρα τρεις αξιοσημείωτες εξελίξεις.

1. Στα μέσα του 2007 ανακοινώθηκε μια λιγότερο αμφιλεγόμενη και πιο θετική χρήση ΓΤ είδους: κάποιες μορφές καρκίνου μπορούν να καταπολεμηθούν με τη χορηγία στους ασθενείς ΓΤ αυγών που περιέχουν πρωτεΐνες, κατάλληλες για καρκινοπαθείς. Διευκρινίζεται ότι τα αυγά αυτά δεν είναι κατάλληλα για γενική κατανάλωση, αλλά μόνο για πάσχοντες.

2. Στο τέλος του 2007 ο Υπουργός Γεωργίας, Φυσικών Πόρων και Περιβάλλοντος ανακοίνωσε ότι το κυπριακό κράτος θ' αναλάβει επιστημονική μελέτη για να υποστηρίξει τη θέση του ενάντια στους ΓΤΟ.

3. Αρχές του 2008 δημοσιοποιήθηκε η απόφαση της Κομισιόν για το Πολωνικό νομοσχέδιο για την εισαγωγή/απελευθέρωση ΓΤΟ. Τα άρθρα του νομοσχεδίου που επέβαλλαν μεγαλύτερους περιορισμούς στην απελευθέρωση ΓΤΟ στο περιβάλλον από' τι προβλέπει η Κοινοτική Οδηγία, απορρίφθηκαν. Στην Επίσημη Εφημερίδα των Ευρωπαϊκών Κοινοτήτων της 19/1/08, επεξηγείται λεπτομερώς (δέστε παρ. 45-52) κάτω από ποιες συνθήκες μπορούν να παρακαμφθούν οι κοινοτικές πρόνοιες: όταν έρθουν στο φως νέα επιστημονικά στοιχεία για είδος/περίπτωση που αφορά ειδικά το συγκεκριμένο κράτος-μέλος, και τα στοιχεία προέκυψαν μετά την ένταξη του κράτους αυτού στην ΕΕ. Από την τοποθέτηση αυτή προκύπτει ότι δεν γίνονται αποδεκτά διάφορα γενικής μορφής επιχειρήματα (όπως ο πολυτεμαχισμός του κλήρου) και συνεπώς δεν μπορεί να νομιμοποιηθεί η γενική απαγόρευση ΓΤΟ. Κάθε απαγόρευση ΓΤ είδος/προϊόντος πρέπει να τεκμηριωθεί ξεχωριστά και το βάρος της απόδειξης ανήκει στο κράτος-μέλος.

   Αυτή η εξέλιξη είναι απογοητευτική για την Κύπρο, μια και πολλά από τα γενικής φύσης δικαιολογητικά μας είναι όμοια με αυτά της Πολωνίας, αλλά τουλάχιστο έχουμε τώρα προειδοποιηθεί, ώστε να παραθέσουμε καλύτερα τα επιχειρήματα μας. Η προσπάθεια απαγόρευσης των ΓΤΟ πρέπει να συνεχίσει παρά τις δυσκολίες.

Executive Summary

GENETICALLY MODIFIED ORGANISMS: WHERE ARE WE NOW IN EUROPE AND IN CYPRUS?

This desk study explores issues relating to genetically modified organisms (GMOs), with a view to assessing whether the views and positions put forward by Terra Cypria and the Laona Foundation on these issues are still valid. So far, the Foundations have opposed GMOs for reasons that include: the small size of agricultural plots in Cyprus and the consequential risk of contamination of neighbouring plots; the high level of endemicity in Cyprus, which could be put at risk by GMO contamination; the fact that Cyprus does not possess the infrastructure for proper monitoring and control; the need to apply the Precautionary Principle in view of the unknown aspects of GMOs. The two main issues being considered are:

- Whether foods containing GMOs are safe, or could they affect human health; and
- What are the risks to humans and the environment of allowing GMO crops to be cultivated in Cyprus?

There is a third issue: that of fodder provided for Cypriot livestock. We have little doubt that much of our livestock has been fed on genetically-modified feed from the time before there were controls in place. Research and assessment, as well as imposing controls in this case, is a rather more complicated issue, currently being debated in Europe. Thus, this aspect has been deferred for fuller consideration in a later report.

The major questions addressed by this study are given below with summarised replies:

1. **Why are we afraid of GMOs? Are there cases of recorded changes to humans, animals or plant species from the effect of GMOs?**
   This section (Chapter 1) discusses risks related to cancer (stemming from gene flow between species that leads to a mutation), allergies, DNA transfer, evidence from tests on rats, insects, as well as plant species.
   Our conclusion is that there is no conclusive proof that GMO foods are safe or unsafe. The 'Precautionary Principle' should apply – controlling GMO foodstuffs and fodder until positive proof of their safety is available.

2. **What is the EU legal position on GMOs? Are grains/products being promoted by EU Directorates? If so, which Directorates and on what grounds?**
   An account is given as to why some countries consider GMOs acceptable, or even beneficial, thereby justifying their approval. It is also explained how grains/products are submitted for approval by the manufacturers and secure approval based on EU Regulations. The EU position as expressed by the Directives and regulations issued, is that they consider the 18 products approved so far to be safe for use by human or other species (as the case may be). The Commission has also decreed that food stuffs containing GMOs below 0.9% are safe, but should be properly labelled.
   Although it could be said that European legislation permitting GMOs reflects pressure from the US-dominated World Trade Organisation and ignores public opinion (see Chapters 2, 3, & 4). EU legislation is comparatively strict. Nevertheless, a number of EEC states are not in agreement with European legislation and have taken various measures to ban GMOs at a national or regional level. The EU has so far been unable to secure the qualified majority required to force these countries to comply with Community regulations. (see Chapter 7).

3. **What is the position of the European Parliament on GMOs?**
   This section (Chapter 3) lists relevant legislation passed by the European Parliament and discusses the positions put forward by MEPs, which are divided.

4. **What is the position of the European Directorate General for the Environment?**
   Although unable to deviate from the overall EU position, DG Environment expresses concern and has gone so far as to emphasize the need for independent scientific research prior to EU approval of GMOs. (Chapter 4).

5. **What is the position of other stakeholders on GMOs?**
   The positions of the following stakeholders are presented at Chapter 5.
   - The European Landowners Association (ELO) and Europbio: in favour of biotechnology and GMO cultivation.
   - The main European environmental NGOs are against GMOs, emphasizing the risks involved.

   The Canadian case of Monsanto v. Schmeiser is also discussed.

6. **What is the prevalent public opinion on GMOs?**
   The public's attitude to GMOs is analyzed on an EU, member-state and Cyprus scale (mostly based on Eurobarometer findings).
   European popular opinion is unanimously against GMOs – in Greece overwhelmingly so. Cypriots also strongly disapprove although some questions were raised about whether there was an even-sided public debate. (See Chapter 6).

7. **What is the situation in other European countries? Which countries have achieved GMO-free status and on what legal basis?**
   As mentioned above, a number of EEC states have chosen not to follow European legislation and have banned GMOs. The EU has so far refrained or been unable to insist that these countries comply with Community regulations. The general understanding seems to be that whereas a national ban prohibiting all GMOs would contravene EU legislation, decisions by regional authorities, or a national ban on a specific GMO strain, based on available legal grounds, can be applied.

   This section (Chapter 7) features a table that illustrates the current situation in Europe on a country by country basis as at July 2007. The table indicates the GMO status of each state, specifies the number of regions within a state where GMOs have been banned and summarises the legal basis for achieving the ban (where appropriate). It should be clarified however, that in most cases such bans are not legally binding in the strict sense but depend on the goodwill of farmers and landowners to reject GMO crops.

   There are three GMO-free countries in the EU at present (Greece, Austria and Poland). Comments are made on how they achieved such status. There is also reference to Hungary's national-scale ban on GM maize MON 810, as well as the position in Malta.

Conclusions

The issue of GMOs still involves a considerable degree of uncertainty. In Chapter 8 the report summarises these prevailing uncertainties in terms of science, ethics and the impact of GMOs, as well as current practices. It is unrealistic to hope we can keep out foreign foods containing GMOs, but we should insist on them being labelled and displayed separately. Crops composed of GMOs are another matter. In an island as small as Cyprus, it would be virtually impossible to contain GMO crops within specific boundaries (see Chapter 9).

Allowing GMO crops could open a Pandora's box and not just in terms of potential impacts on the environment or to the agricultural sector. It is difficult to monitor and control the use of GM seed - we have already seen how various kinds of contamination are possible and the costs of monitoring and rigorously testing farmers' harvests could be prohibitive. Testing for GMOs requires technical know-how and expensive analysis which may not always be available in Cyprus, while the bureaucratic backlog of documentation created by applications will require many man-hours.

Recommendations
The issue of GM seeds needs to be closely watched. In light of the precautionary principle and the fact that Cyprus is a party to the Cartagena Protocol on Biosafety, this report recommends that until there is real and concrete evidence to show that GMOs are safe and, indeed, better and more beneficial than conventional varieties, the government should find a way to place a moratorium on them, suspending imports of GM seeds, and temporarily banning their use.

Although there is no definitive evidence of the impact on humans from GMOs fed to animals, in view of the still open questions, touched upon in Chapter 1, and the debate currently underway in Europe, this issue should be very closely watched.

It is, therefore, the recommendation of this report :

1. **On the question of crops/seeds, not to allow the importation of GM seed or unprocessed GM crops, the cultivation of GM crops, the use of GMOs by food processors or the use and/or testing of transgenic organisms by local laboratories until such a time as deemed appropriate, and that Terra Cypria and the Laona Foundation should continue to advocate in favour of a GMO-free Cyprus;**
2. **On the question of food containing GMOs, to provide full and open choice to the consumer by demanding easy-to-read labelling and the display of GM foods on separate shelves;**
3. **On the question of animal fodder, to follow closely the current debate in Europe and not to facilitate the lowering of existing controls through artificially-inflated demand.**

Additionally the Government and NGOs can cooperate by forming alliances and lobbying on a European and international level to ensure that European nations wishing to keep GMOs out of their territory can do so, and that consumers will always be able to have a choice on whether they want to use or consume transgenic products. It is important to ensure that EU nations can **continue to have a choice and that EU consumers can always know what they are eating and drinking.** More importantly, our Government should seek alliances with states or regions that have similarly small farming plots (Malta, Mediterranean islands) so that greater prominence and support may be given to the danger of field contamination and to the fact that in these small areas no buffer zone can realistically be effective. Non-governmental organisations would do well to study the matter so that they can express their positions using science rather than rhetoric, and so that they can help to educate the public on the pros and cons of GMOs. **The environmental NGOs and the Consumers Association should align their positions as far as possible.**

This report is followed by a fifteen page Appendix explaining what genetic engineering is about and its historical background (Part 1) with an extended analysis of the pros and cons of GMOs (Part 2).

NOTE: (see p.30 for fuller details)
Three developments which arose after completion of this Report are:

1. The decision of the Cyprus Government to undertake a scientific study in support of banning GMOs (but see 2 below).
2. The European Commission's rejection of attempts by Poland to introduce stricter measures on deliberate release of GMOs into the environment on the ground that such measures can only be sought on the strength of new scientific evidence proved on a case by case basis.
3. The development of GM eggs for use in the fight against cancer. These eggs while unsuitable for general consumption contain proteins that are beneficial to cancer patients

GENETICALLY MODIFIED ORGANISMS: WHERE ARE WE NOW IN EUROPE AND IN CYPRUS?

Consideration of ten relevant points

1. The Dangers of GMOs to Humans, Animals or Plant Species

According to an article in *the Scotsman* by Jeffrey Smith, on GMOs and their risks, "United States Federal Drugs Agency scientists who reviewed the FlavrSavr study warned that GM foods in general might create unpredicted allergies, toxins, antibiotic-resistant diseases and nutritional problems".

a) Cancer risks:

There are small risks of gene flow between species and some scientists believe this can lead to a mutation which may result in cancer. There is no hard evidence yet that eating GM foods causes cancer (and no suggestion that growing them can do so) but it may pay to be wary.

Increased cancer risks to humans have been associated with the use of a GM hormone, injected into cows to increase milk yields. The hormone is Bovine Growth hormone (also known as Bovine Somatotrophin or BST) and its GM version is recombinant Bovine Growth Hormone (rBGH). rBGH, synthesized using transgenic *Escherichia coli* (*E. coli*) bacteria may ultimately render the milk carcinogenic.

The cancer risk is not due to levels of BST (although the BST in milk from treated cows is chemically different, which could have adverse health effects) but due to the levels of another hormone, Insulin Growth Factor- 1 (IGF-1). Scientists have linked it to breast, colorectal and prostate cancer and have suggested that IGF-1 may promote the growth and increase of cancerous cells. rBGH is banned in the EU and Canada.

b) Allergies:

The risk of allergies seems to be a real one. As long ago as 1999, a study by a food sensitivity specialist in the UK showed that allergic reactions caused by soya had skyrocketed over the previous year. A Daily Express article at the time noted that it was becoming impossible for food manufacturers to guarantee that their products were GM-free as GM and natural soya were mixed in the US before being shipped to the UK.

The researchers at the York Nutritional Laboratory suggested that the findings provided the first real evidence that GM foods could have an effect on the European body. The study prompted the then Health Secretary, Frank Dobson, to call for a ban on GM foods.

c) Tests on rats

According to Jeffrey Smith "a UK government-funded study demonstrated that rats fed a GM potato developed potentially pre-cancerous cell growth, suffered damaged immune systems and partial atrophy of the liver, and inhibited development of their brains, livers and testicles".

Smith also refers to an early 1990s US study where rats were force-fed GM tomatoes and several of the rats developed stomach lesions; seven out of the 40 rats died within two weeks.

d) DNA transfer

One more possible health concern is the transfer of transgenic DNA from GM plants to non-plant organisms (trans-kingdom transfer) such as the microflora in the human gut. No one can really know what effect something like this would have, but it seems it may be possible. The UK government dismissed the likelihood of DNA transfer from plants to animals as "unlikely to occur because of a series of well established barriers". However, a 2004 study in the journal *Nature Biotechnology* criticized this assertion, citing a study that showed that microorganisms found in the bowel of people with ileostomies (resected terminal ileum requiring the use of a colostomy bag) are capable of acquiring DNA sequences from GM foods.

The study concluded that such trans-kingdom transfers of transgenic DNA in the human gut would be highly unlikely to endanger human health, but called on risk assessors to study the matter closely. An analysis of the study by a University of Leeds microbiologist appeared in the

same journal and suggested that in some cases, such as in the transfer of genes encoding resistance to antibiotics, there may indeed be a risk to human health.

The possibility of gene transfer in the gastrointestinal tract of other animals was also raised in the British Medical Association's second interim statement on GM foods and their effects on human health. The BMA's statement notes that the "potential of GM foods to cause harmful health effects is very small" but that "safety concerns cannot, as yet, be dismissed". Since the report was published, there has been little evidence to prove that these concerns were unfounded.

e) Plants

To prove its case in banning MON 810, Hungary undertook environmental impact assessments (EIAs). EIAs were initiated in Hungary in 2003 and focused on a maize variety also originating from the maize line containing the MON 810 genetic construction, which, however, was not included in the Common List of Varieties.

The research, carried out in Hungary under the direction of the Plant Protection Institute of the Hungarian Academy of Sciences, focused on genetically modified maize DK 440 BTY containing the genetic construction YieldGard^{TM} MON 810. Laboratory and small-scale parcel field experiments showed that the long-term presence of the plant in the ecosystem may have adverse effects, such as:

- Bt maize produces 1500-2000 times as much Bt-toxin as is released through a single treatment in conventional crop protection, with the chemical called DIPEL, which contains Bt toxin.
- Other experiments have found that the residues of Bt plants are slower to decompose than their isogenic lines. Some 8% of the toxin produced by the plant remained in the field after harvesting. Indeed, a significant amount of this active toxin could be identified in the soil 11 months later.
- In the soil of the field under the transgenic plant, the entire biological activity was lower than in the control field.
- Caterpillars thriving on herbs in and on the edges of maize fields, hatching during the pollination period, are the most substantially affected by the Bt toxin produced by MON 810. 16 % of the 187 protected butterfly genera in Hungary may be developing on herbaceous weeds along field edges as well. According to the research findings, Bt-containing pollen is most dangerous to *Inachis io* L. and *Vanessa atalanta* L.

(For more on Hungary see Chapter 7.2)

f) Insects

In 2003 the Hungarian Academy of Sciences, Plant Protection Institute, Ecotoxicology Department, Budapest, undertook a study on the effect of pollen of DK-440-BTY (YieldGard) BT maize on the larvae of Inachis 10 L. (Nymphalidae) butterflies. The study observed that after feeding on the GM maize, the larvae experienced weight reduction indicative of development and growth shortages in the early stage. Early larvae mortality was also observed.

g) Livestock.

The question of GMOs entering the food-chain via other species, (i.e. live-stock being fed on fodder containing GMOs), while touched upon in this report, has not been fully addressed, due to its complexity. The matter is currently the subject of hot debate in Europe between the food-stuff manufacturers, and the environmental lobby. The former claim that Europe's 'zero tolerance' is leading to a critical shortage of livestock fodder for European animals,. The environmentalists' position is that the claims of the foodstuff manufacturers are vastly exaggerated and that Europe has the capacity to produce sufficient properly-controlled fodder if the livestock industry were reformed to decrease demand for protein from abroad, and if the current emphasis on using land to grow bio-fuels was re-adjusted.

2. What is the EU legal position on GMOs? Are grains/products being pushed by EU Directorates, and if so, by which ones and on what grounds

The DGs are not really pushing forward specific grains. Rather, it is a case that grains are submitted for approval by the manufacturers and secure approval based on Directives if scientific study shows no grounds for concern.

In the light of the findings described in the previous chapter, what are the arguments in favour of GMOs? Apart from the early claims that GMO crops provided an answer to hunger in Asia and Africa by developing deseace-free strains, large tracts of the developed world are also accepting GMO crops. These countries' farmers are swayed by the advantage of GMO resistance to disease and the lack of dependence on pesticides with all their negative side effects for the environment, and, most certainly, that their farming remains competitive. For a fuller exposition of the benefits see chapter 5.1.

While the official EU position is to accept GMOs providing they are scientifically studied, and specific conditions are met concerning their content and labeling, it could be said that different attitudes are held by different EU Directorates, e.g the Directorate General for Competition and Enterprise is more inclined to accept GMO cultivation on a principle of co-existance, while the Directorate General for the Environment calls for more independent assessment. It is probably true to say that while seeking to satisfy the pro-GMO lobby, the EU is doing so cautiously and in a way that takes public fears into account.

Whereas in the US and, to a far lesser extent, Canadian GM legislation is lax and is seen to favour biotechnology companies, in Europe legislation on GMOs has been quite tight. There are a number of Directives and Regulations which relate to GMOs and the following paragraphs will attempt to provide a summary of these.

The earliest of these worth mentioning was the Directive on the contained use of GM micro-organisms (90/219/EEC) which laid down measures on the contained use of transgenic micro-organisms "with a view to protecting human health and the environment". The Directive required that users of GMOs would be required to keep records and submit several pieces of information to competent authorities. The law set some basic standard for safety during the contained use of transgenic micro-organisms, as well as some considerations relating to health, and placed the responsibility on member states to ensure that adverse effects on health and the environment would be avoided. The member states were required to report to the European Commission. The Directive, which has since been amended by 98/81/EC eight years later, also required that GM seeds have to be authorised before they can be marketed in the EU. Of the eighteen authorised GM strains, eight (four maize and three rape varieties and one soy variety) are authorised for use in foods, according to DG Health's website.

In 2001, Directive 2001/18/EC on the deliberate release of GMOs covered the release of GMOs into the environment. It noted that "Member States shall, in accordance with the precautionary principle, ensure that all appropriate measures are taken to avoid adverse effects on human health and the environment which might arise from the deliberate release or the placing on the market of GMOs".

The Directive replaced a Directive from 1990 and placed an emphasis on labeling of products containing GMOs. It noted that, if products contain transgenic organisms, the words "This product contains genetically modified organisms" must appear either on a label or in an accompanying document.
There is also a set of Regulations dealing with GMOS. For example, Regulation (EC) 1829/2003 deals with the placing on the market of foods or animal feeds containing GMOs. This regulation aimed to harmonise national rules on GM food and feed and noted that, for a GM-containing food to be authorised for sale, it should not:

''(a) have adverse effects on human health, animal health or the environment;
(b) mislead the consumer;
(c) differ from the food which it is intended to replace to such an extent that its normal consumption would be nutritionally disadvantageous for the consumer."

The EU was also one of the first to sign (and one of the first to ratify and put into force) the Cartagena Protocol on Biosafety, an international agreement based mostly on the precautionary principle. The US is not a party; the US has always seemed to be pro-biotech; and their influence in the Word Trade Organisation (WTO) may weaken the EU's ability to control GMOs on the European continent. The EU has recently decided not to appeal a WTO ruling upholding a US-led complaint that the EU is illegally blocking GMO imports.

The case was brought before the WTO in 2003 by the US, Canada and Argentina who claimed that their farmers were losing millions annually because of the EU's policies on GMOs and unwillingness to allow their importation. The 1,148 page ruling found that by suspending the approval of GM products for several years, the EU had applied a de-facto moratorium and had broken trade laws. The WTO also ruled that the six countries that had applied national bans on GMOs- Austria, Belgium France, Germany, Italy and Luxembourg- had violated WTO rules.

Though a Commission spokesman said that the decision was of "entirely historical interest" and suggested that the EU policies will stay in place, the US saw it as a victory and NGOs from Europe and elsewhere expressed their concern and condemned Europe's unwillingness to appeal the decision.

Cyprus has also felt America's strong-arm tactics. In 2005, the US sent a letter to the Cypriot government warning our government that bilateral ties could suffer if Cyprus forged ahead with a plan to put GM foods on separate supermarket shelves. Such an action, according to the US, would stigmatise GM products and contravene our country's obligations to the WTO. In 2007 the Cyprus Parliament made a renewed attempt to legislate for separate shelves which was rejected by the President on the ground that the procedure, specified by the EU for introducing such measures had not been followed. In accordance with procedure the matter went to the Supreme Court for adjudication . There had been no resolution at the time of producing this report.

As of March, 2001, GMO products approved under Directive 90/220/EEC are: vaccine against Aujeszky's disease (also approved for further uses); vaccine against rabies, tobacco tolerant to bromoxynil, male sterile swede rape resistant to glufosinate ammonium (MS1, RF1: used for breeding activities), soybeans tolerant to glyphosate (used for import and processing), male sterile chicory tolerant to glufosinate ammonium (used for breeding activities); Bt-maize tolerant to glufosinate ammonium (Bt-176), maize tolerant to glufosinate ammonium; male sterile swede rape tolerant to glufosinate ammonium (MS1, RF1 used for import and processing); test kit to detect antibiotic residues in milk; carnation lines with modified flower colour, carnation lines with improved vase life, maize expressing the Bt crylA(b) gene (MON810); maize tolerant to glufosinate ammonium and expressing the Bt crylA(b) gene (Bt-11) (used for import and processing).

As of 31 January 2006, GMO products authorized under Directive 2001/18/EC are: maize Roundup Ready NK603 tolerant to glyphosate herbicide, used for import and use in feed and industrial processing, *not for cultivation;* maize-Zea mays L. line MON 863 resistant to corn rootworm, used for import and use of grain and grain products, *not for cultivation;* oil seed rape-herbicide resistant GT73, used for import and in feed and industrial processing, *not for cultivation*; maize herbicide and insect resistant line 1507—CRY 1F, used in import and processing, *not for cultivation*; maize MON 863 x MON 810, for protection against certain insect pests, used for import and use in grain and grain products *not for cultivation*.

As already mentioned, out of the eighteen GM strains authorized to be marketed in the EU, eight (four maize and three rape varieties and one soy variety) are authorized for use in food according to DG Health.

Council Directive 2002/53/EC of 13 June 2002 provides the common catalogue of varieties of agricultural plant species, including 17 GM varieties of maize (for the list of GMO products authorized under Directive 90/22/EEC and Directive 2001/18/EC refer to part III of the Appendix).

3. The position of the European Parliament on GMOs

Relevant legislation:

I. Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms: invited the Commission to bring forward a legislative proposal for implementing the procedures laid down in the Cartagena Protocol on Biosafety to the Convention on Biological Diversity (which embraces the precautionary principle contained in Principle 15 of the Rio Declaration on Environment and Development).

II. Regulation (EC) No 1946/2003 of the European Parliament and of the Council of 15 July 2003 on transboundary movements of GMOs re-iterates the relevance of the precautionary principle and aims to establish a common system of notification and information on transboundary movement of GMOs, uphold the Cartagena Protocol, ensure the safe transfer, handling and use of GMOs considering possible threats to biodiversity and human health.

III. Regulation (EC) No1830/2003 of the European Parliament and of the Council of 22 September 2003 concerning the traceability and labeling of genetically modified organisms and the traceability of food and feed products produced from GM organisms and amending Directive 2001/18/EC.

IV. Regulation (EC) No1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed.

On the 10 October 2006, the European Parliament's Agricultural Committee held a public hearing on GMOs which was attended by MEPs and experts from throughout Europe. The risk of contamination was one of the key issues discussed: the scientists all agreed on the need to establish safe minimum distances when segregating fields with GM crop from those conventional crops but there was no agreement as to what this distance should be. It was also pointed out that such segregation and co-existence management can be very costly.

Strong opinions were voiced at the hearing, both by opponents and by supporters of GMOs. One speaker said that scientists have failed to show humility while an Irish MEP put it more mildly, saying that scientists "have a duty to come out of their labs more frequently to explain their activities to ordinary citizens."

Leopold Girsch from the Austrian food safety agency said that "Austria is not going to authorise products with potential adverse health effects. Our overarching objective is consumer protection". One Finnish representative summed up the proceedings by saying: "the EP cannot bury its head in the sand. We already consume GM-products and we have to ensure the continuity of agriculture in Europe. GMOs are one tool in a toolbox - research is thus vital."

4. The attitude of the EU's DG Environment on GMOs

In 2006 the European Commission's Directorate General for the Environment published a paper titled *EU Policy on Biotechnology* with a foreword by Commissioner Dimas. He discussed biotechnology both in terms of its benefits and its challenges:

> "Biotechnology has the potential, through agronomically improved crops, to deliver better quality food and environmental benefits. Indeed, life sciences and biotechnology offer opportunities to address many of the global needs relating to health, ageing, food and the environment and sustainable development. However, the use of GMOs also raises difficult policy issues and regulatory challenges, and of course ethical questions…. Opinion on this issue is highly polarized in the EU…
>
> Widespread public support is essential. Ethical and societal implications and concerns must be addressed. Having strengthened its legislative framework, the EU will continue to explore outstanding issues and take public concerns into consideration."

In April 2007, Dimas followed the example set by environmental NGOs in criticizing the European Food Safety Authority (EFSA), the Parma-based agency which provides the Commission with independent scientific advice on food safety issues. Dimas noted that the EFSA depends to a very great extent on data given to it by biotechnology firms.

> "There is the question of whether scientific opinions relied solely on information supplied by companies which produce GMOs," Dimas noted. "The EFSA cannot deliver a sound scientific opinion on GMOs. They only examine short term effects and they do not take into account the opinions of member states."
>
> "Applications for cultivation of GMO products raise a whole new series of possible risks to the environment, notably potential longer term effects that could impact on biodiversity," Dimas added.

Perhaps, with Dimas help, the possibility of containing GMOs may improve. Many people see the Commission's failure to revoke Austria's GM bans as a hopeful development for consumers and the environment and a rebuff for the biotech industry. Perhaps, if the Council of Ministers (the Council of the European Union) continues to support nations like Austria, the Commission will begin to change its line on GMOs.

Commissioner Dimas is juggling hard, because he has to push the DG's official position (which is that of the Commission - and don't forget that the Commission is having its arm twisted by the WTO) while trying to listen to (or appear to be listening to) environmentalists' concerns.

5. The position of other stakeholders on GMOs

5.1 The European Landowners Organisation (ELO) and Eurobio

The ELO, which claims to represent millions of landowners throughout Europe, is cautiously trusting of biotechnology. In an opinion paper on GMOs, the organization notes that "ELO promotes the sustainable use of GMOs". It notes:
"GMOs can provide clear benefits for agriculture and the society as a whole. They include economic benefits for farmers (in preventing insect feeding damage, improving weed control programs, preventing crop loss to plant disease), environmental advantages (mitigating loss of soil organic matter, sparing water), as well as direct benefits for consumers (improving the quality and nutritional benefits of food crops, i.e. "Golden Rice"). In addition, they allow a much more efficient production of "green fuel." It has been proven that transferring genes to a target crop plant can improve plant characteristics and help solve difficult agricultural problems".

"ELO is also in favour of research which would produce genetically enhanced plants able to increase yields, make industrial processes more efficient and cleaner, while providing safer, healthier and better-tasting food for consumers. In addition, this new generation of "biotech products" could also be used to develop pharmaceutical products for human health or proteins for life-saving drugs".

"ELO welcomes the EU Commission's decision to improve, within the existing legal framework and in compliance with EC and WTO law, the scientific consistency and transparency for decisions on GMOs, through developing consensus between all interested parties and avoiding undue delays in authorisation procedures. Meanwhile, the organisation underlines that it is important that EFSA's scientific safety assessment process doesn't become too politicised and calls for more transparency when applicants and EFSA are addressing potential long-term effects and bio-diversity issues in their risk assessments for the placing on the market of GMOs"

5.2 **Europbio**, a European-wide industry association is pro-GMO and viewed the Council of Ministers decision to uphold Austria's ban on GMOs as "an alarming indifference to the EU's own rules, and to common sense".

5.3 The position of the main European NGOs

Greenpeace is against GMOs. A 2003 Greenpeace report calls the risk from GMOs such as Roundup Ready soy as unknown and unknowable and calls the use of such products "a massive genetic experiment in which human beings and the environment are the guinea pigs". The report also highlights the risks of genetic contamination and mentions the L-Tryptophan incident. In the report Greenpeace notes that the consumers, who often eat GMOs without their knowledge, do not benefit from the new crops ("they are not cheaper, tastier or healthier") and suggests that only companies like Monsanto stand to reap huge benefits from such products. Greenpeace has applauded Greece's determination to stay GMO-free.

Friends of the Earth campaigns against GMOs and operates a GMO-free Europe website. Helen Holder, a GMO campaigner with Friends of the Earth noted: "Every country must have the democratic right to protect its citizens and environment. Neither the Commission nor the WTO should be allowed to force Europeans to eat genetically modified foods."

5.4 The Cyprus Consumers Association supports that "when GM is used in food production, each product has to be assessed for safety before it can be sold anywhere in the EU. Concerns about GMOs mainly relate to their potential impact on the environment".

5.5 The Canadian case of Monsanto v. Schmeiser

The cranola crop of a farmer called Percy Schmeiser was contaminated by Monsanto's Roundup Ready canola, possibly from seeds flying off passing trucks. Monsanto, a huge multinational with an annual revenue of $6 billion, took Schmeiser to court for patent infringement. The case begun in 1998 and was portrayed in the media as a classic David-and-Goliath confrontation. The trial ended as a pyrrhic victory for Monsanto when the Supreme Court issued their decision in May 2004.

The Court decided that Monsanto's patent was valid, but Schmeiser was not forced to pay Monsanto anything (Monsanto were demanding a $15/acre technology fee, amongst other things- their total demand was $400,000) as he did not profit from the presence of Roundup Ready canola in his fields. The court did not impose punitive damages on Schmeiser, as may have been expected in a patent infringement case, and the decision did not absolve Monsanto of responsibility for genetic contamination, or even consider that aspect. Though there are those who believe Schmeiser knowingly planted Roundup Ready seeds, the trial swung popular opinion in Canada against the multinational; against its aggressive methods which have reportedly resulted in launching of hundreds of infringement cases against North American farmers (most of which were settled out of court), and against GMOs.

Schmeiser still feels aggrieved. His legal bills are in the hundreds of thousands of dollars and he has lost the right to use his strain of canola, which he says took him decades to develop, because he can not prove it does not include the Roundup Ready gene Monsanto patented. "If I would go to St. Louis and contaminate their plots- destroy what they have worked on for 40 years – I think I would be put in jail and the key thrown away," he has noted.

6. Studying public opinion on GMOs

The EU's cautious policy on GMOs has been partly shaped by the attitudes of its citizens. A 2001 EU Eurobarometer survey quoted in an article by Sylvie Bonny in the Electronic Journal of Biotechnology showed that, at the time the survey was carried out (1999), Europeans were quite apprehensive of GMOs. This table is reproduced below as Table A.

The study focused on France in particular, where opinion against GMOs was stronger than in most European states. Just 10% agreed that the risks from GMOs are acceptable while 63% agreed with the statement "GM food is simply not necessary"

Table A: How are GMOs perceived as far as risk, utility, naturalness and danger are concerned?

Why are most Europeans opposed to GMOs? – Factors explaining rejection in France and Europe

Eurobarometer survey 52.1 in late 1999 (Eurobarometer, 2001) (% of answers)

	Opinion:							
Items proposed:	agree		neither agree nor disagree		disagree		Don't know	
	EU	France	EU	France	EU	France	EU	France
- Even if GM food had benefits, it is fundamentally unnatural	71	82	12	9.5	10	6	7	3
- GM food threatens the natural order of things	67	80	13	9	11	6	8	4
- If anything went wrong with GM food, it would be a worldwide catastrophe.	60	69	15	14	12	11	13	7
- GM food is simply not necessary	56	63	18	18	17	13	9	6
- I dread the idea of GM food.	55	67	17	16	22	14	6	3
- If the majority of people were in favour of GM food, then it should be allowed.	29	20	20	20	41	54	9	6
- Of al the risks we face these days, die risk from GM food is quite small	27	26	20	17	39	60	14	7
- The risks from GM food are acceptable	17	10	18	21	50	61	15	8
- GM food poses no danger for future generation	13	9	17	15	52	65	18	12

Opinion against GMOs was shown to be even stronger in Greece. Asked to state whether they agreed or disagreed with the statement "I do not want this type of food", more than 50% of respondents agreed in each and every one of the nations included in the survey. In Greece, 93% of those questioned agreed, more than in any other country. This could be seen as a success for environmental NGOs in a nation where public opinion has led to a nationwide moratorium on GM crops.

Public opinion in Cyprus seems also against GMOs, certainly, according to a Eurobarometer study, and also judging by the complaints and issues raised by concerned citizens and the support given to the issue by Parliament. There is a view that the public debate was one-sided and alarmist. That said, it would be accurate to state, however, that people in Cyprus are very concerned about the quality and suitability of the food they eat. One 2006 study of Limassol by the Consumers Association showed that the issue of food quality (which included the issues of GM foods as well as expired or infected foods), was third in a list of concerns among more than 300 people. People are indeed very concerned about what they put into their bodies.

Figure 1

"Could you please tell me if you tend to agree or tend to disagree with this following statement about GM food: "I do not want this type of food'' (% of answers)

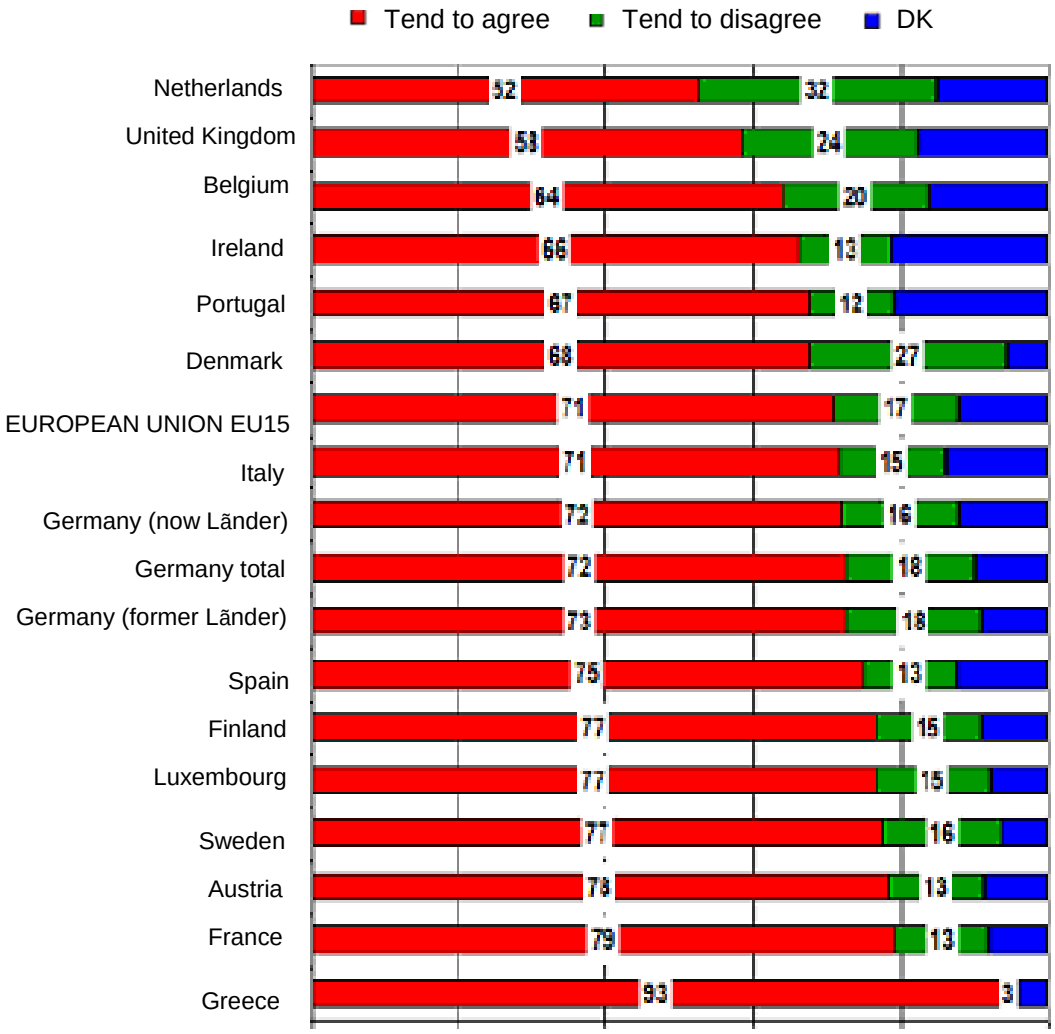


Figure 1. European opposition to GM food by country.
Source: Eurobarometer 55.2, organized and supervised by EC. Poll carried out between 10 May and 15 June 2001; 16029 people questioned, an average some 1000 people per Member State (Eurobarometer, 2001)
Countries are marked by increasing level of rejection.
(DK – don't know)
Germany (new Lãnder): former East Germany
Germany (former Lãnder): former West Germany

A more recent Eurobarometer study showed similar trends to both the earlier European-wide study but also to the findings of the Cypriot Consumers' Association. Forty-one percent of Cypriots noted they were "very worried" about GMO products in food and drink, more than in any other country. In addition 76% were worried to some extent. The government needs to bear this in mind both when formulating GMO policy (especially policy on the sale of food products containing GMOs) and when explaining its position to concerned Cypriots.

Table B

QB5.2 For each of the following issues, please tell me if you are very worried, fairly worried, not very worried or not at all worried by it?

Genetically modified products in food or drinks

	Total	Very worried	Fairly worried	Not very worried	Not at all worried	OK	Worried	Not worried
EU25	24642	25%	37%	24%	10%	3%	62%	35%
BE	1047	18%	34%	33%	14%	1%	53%	47%
CZ	1011	21%	29%	31%	14%	5%	50%	45%
DK	1011	22%	33%	29%	13%	3%	55%	43%
D-W	1015	30%	34%	23%	12%	1%	64%	35%
DE	1528	29%	33%	25%	12%	1%	62%	37%
D-E	510	23%	30%	30%	16%	1%	53%	46%
EE	1009	17%	34%	30%	11%	8%	51%	41%
EL	1000	40%	41%	13%	5%	2%	81%	17%
ES	1016	18%	38%	29%	11%	4%	55%	40%
FR	1014	27%	38%	21%	9%	4%	65%	30%
IE	1000	16%	34%	27%	17%	7%	50%	44%
IT	1000	33%	43%	16%	4%	3%	77%	20%
CY	502	41%	36%	14%	9%	1%	76%	23%
LV	1049	36%	34%	16%	9%	5%	70%	25%
LT	1002	29%	34%	17%	11%	9%	63%	28%
LU	500	25%	40%	21%	11%	3%	65%	32%
HU	1012	33%	30%	22%	12%	4%	63%	33%
HT	500	20%	33%	25%	11%	11%	52%	36%
HL	1000	13%	29%	38%	17%	2%	42%	55%
AT	1012	33%	36%	25%	4%	2%	69%	29%
PL	999	30%	42%	16%	5%	7%	72%	21%
PT	1000	16%	38%	27%	13%	6%	54%	40%
SI	1037	24%	44%	24%	5%	2%	68%	30%
SK	1056	12%	41%	30%	13%	4%	53%	43%
FI	1003	13%	33%	40%	13%	1%	46%	53%
SE	1000	11%	35%	36%	17%	2%	46%	53%
UK	1334	20%	34%	30%	13%	3%	53%	44%

Source: Special Eurobarometer report 238 (Feb. 2006)

7. The actual situation (as of July 2007) in Europe on a country by country basis.

The table on that follows shows the GMO status of European states, indicating in the second column the country's status in relation to allowing the cultivation of GMOs; the third column indicates the number of regions within a state where GMOs have been banned and the final column summarises the legal basis for achieving the ban (where appropriate). It should be noted that bans do not necessarily mean 'blanket bans' on all GMOs, but could be on particular varieties only.

Table C: The GMO-status of European states (based mainly on voluntary declarations but also in some cases on legally binding instruments).

Country	GMO Status	Number of GMO-free regions?	Basis for achieving status?
Austria	GMO-free country	- 9 Bundesländer (all) - Over 100 municipalities	Article 16 ('safeguard clause') of Directive 90/220/EEC Article 23 Directive 2001/18/EG
Greece	GMO- free country	54 prefectures (all)	Article 16 Directive 90/220/EEC
Poland	GMO- free country	-16 regions (all) -over 300 farms declared themselves GMO-free zones	- regions declared themselves GMO-free - national Parliament passed 2 Acts in 2006: Act on Seeds, Act on Feeds, which enforced a general ban.
Cyprus	Overall status to be decided. GMO-free within Natura 2000 sites.	6 municipalities: Ayios Athanasios, Engomi, Larnaca, Latsia, Strovolos, Yermasogia .	Municipalities passed declarations.
Albania	To be decided. Presently a 5 year ban on GMOs which came into effect in 2005 is in force.		
Belgium	Partial ban (in certain regions)	120 municipalities (39 in Flanders, 81 in Wallonia)	Municipalities passed declarations.
Bulgaria	GM- free within National Ecological Network area & in 30-km buffer zone around it. - 2005 legislation prohibits several GM crops but allows maize, soybean & grapeseed	5 regions	Regions declared themselves GM-free by signing the European Declaration
Croatia	Partial ban	12 counties (out of 20)	Counties passed declarations.
France	Partial ban	6 Departments, 15 regions, 1250 municipalities	Passed declarations

Germany	Partial ban	27,000 farmers, 80 municipalities, majority of Protestant church-land	Farmers sign **legally binding** contracts not to grow GMOs
Hungary	National-scale ban on GM maize MON 810	2 regions and 61 communities	-national ban based on Article 23, Directive 2001/18/EC
Ireland	Partial ban	9 counties, 5 towns/cities, 1000 zones through private initiatives.	Passed declarations
Italy	National government ratified Tuscany region's GMO ban. (Nearly 80% of Italy is GMO-free).	15 (out of 20) regions, 27 provinces & 2446 municipalities	Passed declarations
Luxembourg	Partial ban	9 municipalities	Passed declarations
Former Yugoslavian Republic of Macedonia(FYROM)	Partial ban	1 region	
Malta	To be decided	None yet	
Netherlands		1 city (Culemborg)	Passed declarations
Portugal	Partial ban	1 region, 26 municipalities	Passed declarations
Romania	National ban since January 2007 on cultivation of herbicide resistant Roundup Ready soybeans.	24 communes, 2 cities	Passed declarations
Serbia	National ban on import of whole grains to prevent planting of GM crops.	none	National legislation
Slovakia	Partial ban	10 municipalities	Passed declarations
Spain	Partial ban	4 regions, 30 municipalities	Passed declarations
UK	Welsh Assembly adopted GM-free policy	4 Councils in Scotland, 60 areas in England	Passed declarations

7.1 There are three GMO-free countries in the EU at present. How did they achieve such status?

Greece and Austria used Community Law, whereas Poland enacted national legislation that bans GMOs.

In Poland efforts to keep GMOs out started in 2004 with local government action. In September 2004 Podkarpackie Voievodeship local government announced itself to be a GMO-free zone. By 2006 16 local governments announced they were GMO-free zones. These declarations, however, were not legally binding.

In 2006 the Polish national government passed the Seeds Act and the Feeds Act, which established a general ban on GMOs. The Seeds Act of April 27 2006 Article 1(5) states that "genetically modified varieties can not be registered in the National Variety Catalogue". Article 1 (43) establishes that "genetically modified seeds propagating material can not be placed on the market on the territory of the Republic of Poland".

This ban is considered an infringement of Directive 2001/18/EC Article 22 and Article 23, as well as of Directive 2002/53 Article 4 and article 16. The European Commission has initiated official procedures against Poland in accordance with Article 226 of the Treaty on European Union.

The Feeds Act 2006 prohibits the placing of GM feeds on the Polish market. Article 1 paragraph 1(4) of the Act states that "it is forbidden to produce, place on the market and use for animal feeding genetically modified feeds and genetically modified organism designed for feed usage".

Commission Decision 2006/335/EC of 8 May 2006 accepts the prohibition from Polish territory of the usage of GM varieties of 16 maize MON 810 (listed in the Common Catalogue of varieties of agricultural plant species, pursuant to Council Directive 2002/53/EC). These maize varieties are considered unsuitable for Polish agriculture due to the country's climate conditions.

In 1999 Austria banned GM maize and rapeseed by invoking Article 16 Directive 90/220. The Commission has tried to overrule this "Ordinance on Genetically Modified Seed", but member-states have supported the ban. Following the WTO criticism of Austria's position on GMOs, the Commission was keen to see Austria's ban repealed. On 18 December 2006, the EU Environment Ministers did not support a Commission proposal to lift the Austrian bans. Thus, Austria is allowed to remain, for the time being at least, GMO free.

The judgment in the Joined Cases T-366/03 & T-235/04 *Land Oberösterreich and Republic of Austria v Commission* clarifies a number of points in respect of the procedure and substantive conditions to be complied with when Member States want to introduce new legislation on the protection of the environment which diverges from a harmonization measure adopted by the Council pursuant to Article 95 EC. In other words, the judgment deals with the extent to which there is pre-emption by the EC when it legislates under Article 95 EC.

Land Oberösterreich, the region of Upper Austria, sought to introduce new measures to ban the cultivation of seed composed of GMOs which were stricter than those laid down by Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC. Austria notified those measures to the Commission under Article 95 § 5 EC. The Commission took a decision prohibiting those measures on the ground that the substantive conditions of Article 95 § 5 EC were not fulfilled. Then the Land Oberösterreich and Austria brought an action to annul the Commission's negative decision.

The Court of First Instance's judgment upheld the Commission's decision. It is interesting because it states that the member state has no specific right to be heard by the Commission during the course of procedure leading to the adoption of the decision specified in Article Article 95 § 6 EC; that the member state invoking Article 95 § 5 EC bears the burden of proving that its conditions are fulfilled; and that the precautionary principle cannot apply if the conditions of Article 95 § 5 EC are not fulfilled.

Incidentally, the Court of First Instance held that the Land Oberösterreich had the legal standing to seek annulment of the decision even though that decision was addressed to Austria, because it was the legislation of the Land Oberösterreich which was at stake.

In Greece all 54 prefectures, and thereby the whole country, has been declared GMO-free. Greece upholds a restriction on the GM swede rape Topas 19/2 under article 16 Directive 90/220 (the 'safeguard clause') and against GM maize MON 810 under Article 23 of Directive 18/2001.

Despite 19 field trials in four years from 1996-1999, Greek farmers' fields have remained GMO free. Greece also placed an import ban on GMOs (using a national safeguard clause, much to the dislike of the Commission which has tried to convince Greece to lift the ban) and has restricted the import of several new varieties.

The WTO has ruled that six countries that had applied national bans on GMOs (Austria, Belgium, France, Germany, Itlay and Luxembourg) had violated WTO rules. In 2005, Environment Ministers from across Europe voted to allow nations to keep their bans on GMOs, rejecting a Commission proposal that would have seen these bans lifted. However, the WTO, in its recent ruling, criticized the Greek ban on GMOs. The US will be placing greater pressure on the Commission to ensure that the bans- in Austria and Greece (where the bans apply to the whole country), Luxembourg, France, Italy, Belgium and Germany (which have partial bans) are rescinded soon.

7.2 How did Hungary manage to enforce a national-scale ban on GM maize MON 810?

This was achieved on the basis of Article 23(1) of Directive 2001/18/EC of the European Parliament and the Council of 12 March 200,1 on the deliberate release of genetically modified organisms into the environment, which repeals Council Directive 90/220/EE. This article reads as follows:

'1. Where a Member State, as a result of new or additional information made available since the date of the consent and affecting the environmental risk assessment or reassessment of existing information on the basis of new or additional scientific knowledge, has detailed grounds for considering that a GMO as or in a product which has been properly notified and has received written consent under this Directive constitutes a risk to human health or the environment, that Member State may provisionally restrict or prohibit the use and/or sale of that GMO as or in a product on its territory.

The Member State shall ensure that in the event of a severe risk, emergency measures, such as suspension or termination of the placing on the market, shall be applied, including information to the public.

The Member State shall immediately inform the Commission and the other Member States of actions taken under this Article and give reasons for its decision, supplying its review of the environmental risk assessment, indicating whether and how the conditions of the consent should be amended or the consent should be terminated, and, where appropriate, the new or additional information on which its decision is based.'

The Hungarian national gene technology authority has found that in the case of the in-bred lines and hybrids originating from the MON 810 maize line, the criteria specified in Article 23(1) of Directive 2001/18/EC in Hungary justify the introduction of the prohibition and the introduction of the protective clause procedure.

7.3 What is the position in Malta, which was attempting to declare the whole island GMO-free?

When seeking ideas of how Cyprus can shape its policy on GMOs, it is of value to consider policies in other countries, particularly those of nations similar to Cyprus. Malta is much smaller than Cyprus, consisting of an archipelago of seven islands, of which only three are populated. Malta has, like Cyprus, only recently entered the EU. It is a growing nation that relies on tourism and shipping. The environment, for so many years ignored, is now being considered to a much greater extent when decisions are taken and the people have become more environmentally aware - NGO membership per 1000 people is far higher than in Cyprus.

Seven Maltese NGOs have come together to demand that, in accordance with the precautionary principle, Malta remains GMO free. The Maltese government has so far been supportive of their calls. Though there are no laws in Malta that regulate GMOs (other that those transcribing the European Directives and Regulations, which the Maltese government is working to integrate) the presence of a strong environmental lobby and an increasing concern over the risks of GMOs were enough to convince the Maltese government that a study on the impacts of GMOs and the legislation relating to them was necessary.

The study recommended the setting up of a Biosafety Coordinating Committee (the BCC). This was established in 2002 with the aim of providing an integrated approach to biosafety, to the contained use and deliberate release of GMOs, and to placing on the market products containing GMOs. Its main function is to advise the government's Environment and Planning Authority (MEPA) and the Minister for Rural Affairs on the impacts of GMOs. The BCC must receive copies of all applications for the use of a GMO from the MEPA. It then examines each application on a case-by-case basis and makes its recommendations to the MEPA. The BCC then sends its findings to the European Commission.

Cyprus would do well to follow this kind of system by setting up a competent authority that is made up of experts in molecular biotechnology, biochemistry, planning and environmental assessment or environmental health, just as Malta has.

8. A Summary of Prevailing Uncertainties

"In these matters the only certainty is that nothing is certain".
Pliny the Elder, Roman philosopher

The paradox above is two millennia old, but remains familiar in this age of uncertainties. It applies also to GMOs, where the uncertainties are many. These are highlighted below, in point form, ending with a *caveat.* Perhaps it is better to be safer than sorry.

On the science, ethics and image of GMOs:

- GMOs are unnatural, as are the many breeds of dog (although the consumption of dogs is voluntary!)
- Genetic engineering is a science, BUT splicing can be haphazard.
- GMOs may bring an end to world hunger, BUT perhaps a fairer distribution of land and funds and change in world politics is just as likely to achieve this.
- Most Europeans oppose GMOs, although GMO protagonists allege that this attitude stems from a lack of informed debate
- The US promotes GMOs, perhaps under the influence of multinationals like Genentech, Bayer and Monsanto.
- While Monsanto have been aggressive in marketing their product and pursuing copyright infringement cases, such an attitude is common to many large corporations.

On the impacts of GMOs:

- GMOS seem to have health effects; science is divided.
- We do not have enough sound knowledge of GMOs despite the fact that people have been creating them for decades and growing GM crops for more than ten years.
- Transgenes may be absorbed by bacteria in the human gut; there is no evidence yet that this can have harmful effects.
- Growing GM crops generally may impact negatively on wildlife although the GMOs may not be the only cause of this impact (and in some cases no harmful effects were noted – indeed in a handful of instances there may be a short term rise in some insect populations where GM crops are grown.)
- Once GM crops are field tested they may end up contaminating huge expanses, wiping out strains created by selective breeding and making organic farming impossible. Segregation may avoid contamination, but is difficult and expensive to implement and may still render organic farming impossible.

On current practices:

- Unprocessed GM products are not currently available in supermarkets but there is a good chance that the corn syrup, maize starch or soy lecithin in a product you buy may contain or be produced using GMOs. Cotton apparel has been made from GM cotton for years.
- GM crops are grown on a limited scale in Europe except in Spain, where they are found on a larger scale, but fields throughout Europe may be contaminated with GMOs.
- The EU has a much tougher position than the USA on allowing GM foods and crops but this stance may be contravening WTO regulations to which they have previously agreed.
- The WTO has moved against a number of EU countries that have placed unilateral bans and the European Commission has also tried to get such bans repealed but perhaps the rights of the consumer should outweigh any trade agreement.
- There is only a little proof so far to suggest that GM crops and GM foods may be harmful to the environment and humans respectively, BUT the precautionary principle demands care if something cannot be proven to be harmless.

9. Major conclusions for Cyprus:

Better safe than sorry: The need for precaution in Cyprus, but also for scientific rigour and a strong legal argument to back our position.

At present, Cyprus has no final position on GMOs, although it is working its way towards becoming GMO-free, without yet demonstrating the requisite legal and scientific backing. There is no nationwide moratorium (although some regions and towns have independently declared themselves GMO free (but it is not quite clear if this declaration has involved agreement with stakeholders, such as farmers, or simply statements by the local authority). Cyprus has no specific GM legislation other than that handed to it from Europe. However, it does not allow GMOs in strains that could be related to endemic species and it is the first EU state to have enacted that there can be no GMOs in Natura 2000 sites (new member-state Bulgaria now has similar provisions with a 30km protection radius!). The official stance bravely taken by Cypriot Ministers at EU meetings has always been very cautious towards GMOs. In Council debates throughout 2005-2006, Cyprus has taken the position that:

> "We have serious reservations on this issue, considering the small size of our country. The safe co-existence of genetically modified cultivations with conventional or organic agriculture in small island states such as Cyprus, is considered essentially impossible. Taking into account various factors such as: increased biodiversity, related threat of alteration to species, and the dispersed and very small agricultural lot, makes it evident that the allocation of zones would be purely a theoretical mapping exercise."

Cyprus is a party to the Cartagena Protocol on Biosafety and has ratified the Protocol (the US, for example, is not a member and neither is Argentina- one of America's allies in the WTO- which has signed, but not ratified, the agreement) which begins, quite simply with:

> "In accordance with the precautionary approach contained in Principle 15 of the Rio Declaration on Environment and Development, the objective of this Protocol is to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing on transboundary movements".

The Cartagena Protocol which has developed out of the Convention on Biological Diversity, Rio, 1992, has been criticised as being too bureaucratic, but it is also considered useful by many. It encourages precaution, it requires that nations report their decisions back to a Biosafety Clearing House, and it also seems to encourage trade, so long as caution is exercised where necessary. Below is an extract from the Protocol's preamble. Note the last few lines of the text (in italics).

- Aware of the rapid expansion of modern biotechnology and the growing public concern over its potential adverse effects on biological diversity, taking also into account risks to human health,- Recognizing that modern biotechnology has great potential for human well-being if developed and used with adequate safety measures for the environment and human health,
- Recognizing also the crucial importance to humankind of centres of origin and centres of genetic diversity,
- Taking into account the limited capabilities of many countries, particularly developing countries, to cope with the nature and scale of known and potential risks associated with living modified organisms,
- *Recognizing that trade and environment agreements should be mutually supportive with a view to achieving sustainable development,*

- *Emphasizing that this Protocol shall not be interpreted as implying a change in the rights and obligations of a Party under any existing international agreements,*
- *Understanding that the above recital is not intended to subordinate this Protocol to other international agreements…"*

The Cartagena Protocol is not a reason for Cyprus to ban GMOs, nor enough of a justification to do so, but it is a useful international agreement to call upon if Cyprus does place a moratorium on GMOs and if this moratorium is questioned by the European Commission or others. The reasons why such a moratorium might be considered are summarised below.

There is a lot of evidence, though much of it is circumstantial, to suggest that GMOs may indeed be harmful to animal and human health and to the environment. But GMOs are already on our supermarket shelves and there is little one can do about that, except demand the proper labelling of foods so that the consumer is able to make a real, informed choice. Allowing the WTO to impose its will or letting the Commission lift bans is an interference with the right of choice; not telling consumers what they are putting on the plates and in their mouths (as is the case in the US) seems almost dishonest, at least to many of us in Europe. Biotech supporters have argued that GMOs are the future and that those who oppose GMOs are ignorant or, worse, paranoid (although much evidence suggests that they are not). However, not a single GM expert, biotech representative or politician has ever directly suggested that governments and consumers should not be given the right to choose what they want in their fields, on their supermarket shelves and on their plates.

One thing Cyprus can do especially in light of the "better safe than sorry" attitude of the precautionary principle – is to ensure that GM crops are not cultivated in this country. Cyprus does not need them- traditional varieties have worked well so far (in particular the Cyprus potato) - and the risks could be too great for all of us, including for the farmers who will be using them. When the small size of our island is taken into account, it is all too easy for contamination to take place- no safe minimum distances for coexistence seem to have been agreed on and seeds and pollen may be transferred by wind, birds and bees resulting in fields all over Cyprus being contaminated with GMOs. It would therefore prevent organic farming almost anywhere on the island. The costs of monitoring and rigorously testing farmers' harvests could be prohibitive. Testing for GMOs requires technical knowhow and expensive tests which may not always be possible in Cyprus, while the bureaucratic backlog of documentation created by applications will require many man- hours.

Until there is real and concrete evidence to show that GM seed are safe and, indeed, better and more beneficial than conventional varieties, then it is recommended that the government places a moratorium, suspending imports of GM seeds and temporarily banning their use.

At some point in the future this decision may be reversed. But now it is unreasonable to allow GMOs when the potential risks seem to outweigh the benefits and when there is strong opposition to their importation and use.
However, following the court case regarding the Austrian ban on GM maise, it seems that a national ban on GM crops is not legally feasible unless backed with strict science as done by Hungary. It also seems that bans can be imposed on a regional basis, preferably involving institutions other than governments. Equally a 'blanket ban' covering all GMOs is not possible. Each and every GM seed/product approved by the European Commission has to be examined on its own merits (hence the success of Hungary in banning GM maise MON810). Therefore, using the examples of Austria and Hungary, Cyprus needs to start its own studies to identify on a scientific basis the specific risks that could apply and to follow a legal procedure for banning that is defensible. The recent refusal (October 2007), to include a GM potato seed on our national inventory of potato seed seems a good starting point, since there is every reason to want to protect the early 'cyprus potato' and its market value.

10. Recommendations

As we have seen, there are three ways in which potential dangers from GMOs may affect us: manufactured foods containing GMOs; fodder containing GMOs given to animals bred for market use; and growing GM crops. In the light of the preceeding information and the lack of certainty (and openness) that prevails, **it is the recommendation of this report:**

1. **On the question of crops/seeds, the Cyprus Government should not allow the importation of GM seed or unprocessed GM crops, the cultivation of GM crops, the use of GMOs by food processors or the use and/or testing of transgenic organism by local laboratories until such a time as deemed appropriate, and that Terra Cypria and the Laona Foundation should continue to advocate in favour of a GMO-free Cyprus.**
2. **On the question of food containing GMOs, Terra Cypria and Laona should advocate for full and open choice for the consumer by demanding easy-to-read labelling and the display of GM foods on separate shelves;**
3. **On the question of animal fodder, the two Foundations should ask Government to follow closely the current debate in Europe and not to facilitate the lowering of existing controls through artificially-inflated demand.**

Additionally, the two Foundations should promote the following measures:

4. The government should continue to oppose GMOs at the European level, and to argue for independent assessment of GMOs over and above the information provided by the manufacturers. On the domestic level it should liaise with the Consumer's Association and various relevant non-governmental bodies to decide GMO policy, including the establishment of a Maltese-style Biosafety Coordinating Committee.

5. The Government should undertake a scientific study concerning the potential effects of releasing approved GMOs on local species.

6. All official departments whose staff could be invited to GMO-related meetings in Brussels should be advised in detail of our country's standing so that they can hold their own at such meetings.

7. Concerning the introduction of food stuffs (as opposed to seeds) containing GMOs, the consumers' rights (including that of choice) should be protected by insisting that such products are **placed on different shelves** in addition to easy-to-read labelling. However, labelling in itself is not enough. Busy, older or less educated consumers should not be expected to have to read full details of every product, that is why separate display is essential**.** If in the end this cannot be achieved by enactment of the Bill now going through Parliament, ways and means should be sought by interested agencies to achieve this through voluntary agreements with supermarkets. (See the example of Carrefour in France).

8. The numbers of food allergy cases in Cyprus should be monitored. This study will, however, stop short of suggesting that GM crop field trials be held or even that epidemiological trials are carried out. In the case of field trials, this would involve the deliberate release of GMOs in the environment, which is something that we need to avoid if the moratorium is instated. In the case of epidemiological trials (on humans or lab animals) this would involve feeding some subjects with foods containing GMOs. Without even looking into the ethics of this it is enough to say that it is unnecessary- such trials are already being carried out elsewhere and there is no reason for results to be different from country to country. It is, however, important to consider whether results from, e.g. Hungary, can be used within a Cypriot framework.

NOTE

After this report had been completed three issues arose which are worthy of note.

1. News was published in the mid 2007 of a development in the fight against cancer by giving patients genetically modified eggs containing proteins suitable for cancer patients. Consultant Lucas Psillakis was asked to respond to this piece of information. His comments are quoted below.

   ''The cancer charities have welcomed the development which seems to indicate that not all genetic engineering is bad. These eggs are not for general consumption but for treating patients. You or I would not consume them or their extracts. But for patients, whatever the negative effects, these will likely be outweighed by their positive impacts.

   And for once, biotechnology has come up with something truly useful. While one can argue that so many GM products have been produced to line the pockets of a few, and that most of the experiments have had no real purpose, the GM eggs are a more positive development that shows how biotech can do good. Now the biotech industry and the pharmaceuticals industry need to work together to make the treatment easily and cheaply available to all who need them.
   The only concern, at the moment, is from an animal welfare point of view (although there may be risks of contamination to consider as well) – a moral debate rather than a scientific one. In the general euphoria created by this breakthrough, however, we must all remain fully aware of the risks concerning other GMO products.''

2. In late 2007 the Cyprus Minister of Agriculture, Natural Resources and the Environment announced that the Government will undertake a scientific study to support its position on GMOs. It is hoped that the examples of other EU states will be taken into account vis-a-vis the rigorous scientific evidence required as well as the need for input from various agencies.

3. Early in 2008 the European Commission issued its decision on the Polish Draft Law on GMOs. Specific articles placing additional restrictions on the deliberate release of GMOs into the environment were rejected. Two decisions published in the Official Journal of the European Communities of 19/01/08 provide a clear statement (see articles 45 – 52) as to when such derogations may be obtained. The conditions are cumulative and apply in the case of new scientific evidence affecting the environment or the working environment, where the problem is specific to the member state, and where it has arisen after adoption of the harmonization measure. Some of the arguments used by Poland and rejected by the EU (fragmentation of farms, societal fears, need to indemnify farmers) are similar to those which have been raised in a general way by Cyprus. The message from this decision is that the grounds for exceptions are strictly limited to those just mentioned. Thus there can be no general ban on admission of GMOs; they can only be fought on a case by case basis. Moreover it is up to the member-state to prove its case. This may be seen as disappointing news for Cyprus, on the other hand we have been forewarned so as to make a better case than we might have done otherwise.

Appendix

Appendix

PART I : Introducing genetic engineering

An introduction to GMOs: The parable of Thomas Midgley

In 1921, a bright young General Motors scientist called Thomas Midgley, realised that tetra-ethyl lead or TEL, as it became also known, an organometallic compound produced from the reaction of ethyl chloride and a sodium-lead alloy, could act as a very effective "antiknocking" additive in motor fuel. TEL increased the octane rating, protected various engine parts against wear and increased efficiency. In short, TEL was a godsend and Thomas Midgley was hailed as a genius.

Thomas Midgley was a brilliant scientist. He also helped to develop chloroflurocarbons, or CFCs which replaced the various toxic and explosive substances used in refrigerators. And, for many years, his creations were considered harmless to both humans and the environment.

Today we know better. Lead has been faced out of automobile gasoline in America and Europe (although it is still found in car fuel in some countries and in aircraft fuel. CFCs are atmospheric pollutants which damage the ozone layer and can contribute to the greenhouse effect. Midgley's two most famous inventions seem to have done almost as much harm as they have done good.

Thomas Midgley was killed by one of his own inventions. An elaborate system of pulleys that he designed to help him out of bed after he had contracted polio ended up strangling him. It was an embarrassing end to a great scientist who will forever be remembered for all the wrong reasons.

When CFCs and leaded petrol were introduced, they were obviously improvements on what was around at the time. Lacking foresight, few wondered about the negative impacts of developments like these. Whether Thomas Midgely knew or not has been debated many times. Certainly people knew that lead was poisonous and many at the time suspected that TEL would prove to be harmful. Whether Midgley, Kettering, the man he worked for, and their associates and employers were trying to hide the true facts or not is unknown. What is known is that a lot of money was made from TEL.

In a sense, the debate on GMOs, genetically modified organisms, and on the cultivation and use in food products of genetically modified crops brings Thomas Midgley's great inventions to mind. Like CFCs and lead in petrol, GM crops may be a great thing theoretically- the companies that produce certainly seem to think so- but, the uncertainties are great, certainly according to the scientists, farmers and concerned citizens throughout the world who campaign against the cultivation of GMOs and their use in food products.

In the last few years campaigners have a new weapon in their fight against GMOs. The European Commission has adopted a Communication on the Precautionary Principle as "a basis for action where science is unable to give a clear answer" according to a Commission press release. The Communication itself was not as clear as the text within the European treaty a year later that noted that "Union policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Union. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay" but still did not actually define the Precautionary Principle.
Still, the principle has been defined by others and its relation to the GMO debate will be discussed later in this document.

The US Food and Drug Administration (as well as the World Health Organisation) prefers a principle called "substantial equivalence" which dictates that a new product that has the same intended use as known product and the same intended characteristics then it is deemed to be substantially equivalent and, therefore, as safe and effective as the original product. This principle has many critics, most of whom argue that the method is unscientific. One paper published in the esteemed periodical Nature in 1999 concluded that "substantial equivalence is a pseudo-scientific concept because it is a commercial and political judgement masquerading as if it were scientific. It is, moreover, inherently anti-scientific because it was created primarily to provide an excuse for not requiring biochemical or toxicological tests". The paper provoked a number of replies, some of which criticised its conclusions.

The important point to remember is that substantial equivalence should never be a substitute for safety testing but a principle that can be a useful tool for regulatory scientists.

The above is a short introduction to the GM debate. The most salient facts and arguments put forward so far will be outlined on the next pages and this report will aim to make suggestions on whether (and how) GMOs should be allowed into our farmers' fields and onto our supermarket shelves.

Inevitably, some assumptions need to be made and perhaps it is wide to err on the side of caution. Those who seek to understand the debate reach a conclusion need to rely on known facts but also concepts, predictions, estimates and some intelligent guesswork. There is no crystal ball in science.

Evolution and mutation: Darwin explained and expanded

Ever since Darwin, the mechanism by which organisms evolve became known and the way it works has been studied. Before Charles Darwin's groundbreaking theory, people were aware that species evolved and realised that this evolution was effectively borne out of necessity but did not know how. Jean-Baptiste Lamarck, who Darwin recognized as an inspiration, wrote of acquired traits. One way of describing his theories would be to say that he believed that a giraffe, in order to reach the leaves on a tall tree, struggled to lift itself and strained its neck to reach until its legs and neck had, over several generations, grown so that it was best suited to its surroundings and food source.

Darwin realised that physical traits could not be acquired over on, or even several, generations. He believed that some members of a species' population were better suited than others to survive and that they passed on their traits to their offspring. Though Darwin drew his conclusions by studying finches and not giraffes, one could say that his theory would suggest that both short giraffes and taller ones existed once. The taller ones, being most capable of survival (or "fittest") because they could reach the leaves on trees in order to feed, were the ones who lived on to pass their traits onto the next generation. The shorter giraffes simply died out.

It was Gregor Mendel, an Austrian monk (he born in what today is actually a village in the Czech Republic), who first realised how the traits considered by Lamarck and Darwin could be passed on from one generation to the next. Working with pea plants, Mendel theorised the basic laws that governed genetics and recognised the existence of genes and, in doing so, changed the world. Some say that Mendel's results were almost too perfect to have come about naturally and that he "fiddled" with his results to prove his theories. But, regardless of whether he did alter his findings or not, without the father of modern genetics, whose work was not fully recognised until after his death, the world today would be a different place in many ways.

More than a hundred years after Mendel, modern genetics has also studied mutations, changes in genes that occur rarely and randomly, often upon exposure to a mutagen such as radiation or carcinogens. Most mutations are harmless and inconsequential (the kind that might produce an

extra toe or but some are harmful. Some of these happen when the foetus is still being formed but others, such as developing cancer as a result of exposure to radiation, can happen later in life. Very rarely, a mutation can be beneficial because it can lead to a characteristic that will help that organism survive and produce more, or healthier, offspring.

It can be said that gene-splicing (more on which later) is an artificially induced mutation under controlled conditions, in the same way that selective breeding is an artificial survival of the fittest. And there have been success stories. Bacteria and other micro-organisms, for example, have been genetically engineered to produce substances as varied as rennin (chymosin) used to produce cheese (which once could only be extracted from calves' stomachs), insulin (said to be human-identical but suspected of causing pain, fatigue and even deaths in some individuals and vaccines for diseases such as Hepatitis B.

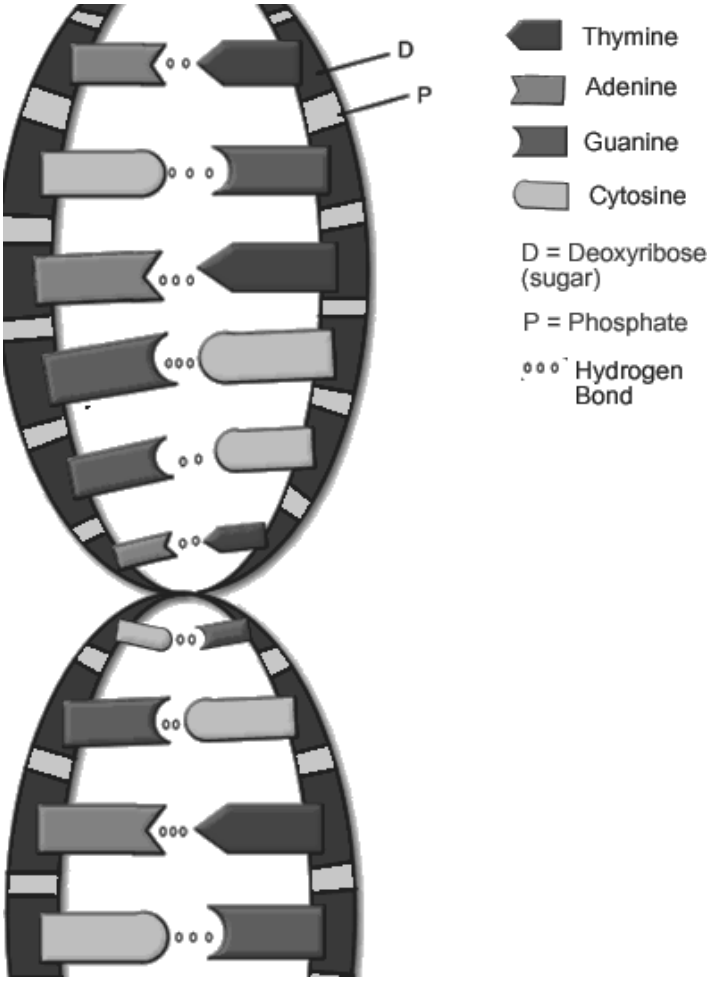
Now biochemical multinationals and their scientists are suggesting that genetic engineering can help to solve a whole host of problems and cure a number of diseases. Many remain unconvinced, suggesting that it is dangerous to play God, and dubbing GM food crops "Frankenfoods". The following pages will point out some of the facts and try to debunk the myths of the GM debate.

The discovery of the double helix and the opening of new worlds

To truly understand genetics, one must look more closely at the structure of genes. When Friedrich Miescher first isolated something found in the nuclei of cells, he named the substance "nuclein" and left it at that. Later, it was realised that nuclein, or what we call "nucleic acid" today, was the compound genes were made of.

When James Watson and Francis Crick published their findings on the double helical structure of DNA (deoxyribo-nucleic acid) they noted, with typical British understatement that the structure had "considerable scientific interest".

Every organism on earth carries with it genetic material, consisting of DNA and/or RNA (ribo-nucleic acid). In higher organisms, the genes containing the DNA are located with chromosomes (man has 23). The DNA itself is made of the nucleotides guanine, cytosine, adenine and thymine. The endless combinations of sets of nucleotides make up the endless variations in living organisms. In essence, whether we are male or female or have have brown eyes or blue is governed by the frequency and order of certain chemicals in the DNA found within each of our cells. Some traits, however, like height or skin colour, can also be affect, to a great extent by outside factors.



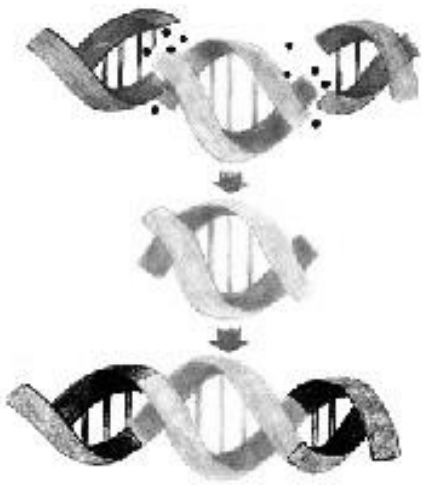
The Structure of DNA (from: http://www.biologycorner.com)

The science of genetic manipulation

Genetic engineering (GE) is the term that is usually used to refer to al the laboratory and industrial techniques that are used to alter the genetic material of organisms. The term is used interchangeably with genetic modification. The actual process behind GE involves a technique called gene splicing, a cutting and pasting of genetic material from one piece of DNA to another piece in a different organism.

First the gene responsible for the desired characteristic must be isolated and extracted. The cutting is done using enzymes called restriction endonucleases which, to put it simply, are used to chop up bits of DNA at specific points. Alternatively the DNA can be built up from RNA using another enzyme, called reverse transcriptase.

The cut piece of DNA is then often pasted into a plasmid, one of the small circular DNA molecules find in bacteria. The plasmid acts as a vector and is then used to insert the gene into the DNA of another organism. Alternatively, a viral vector can be used to "inject" the gene into the host organism's DNA. But, virus being what they are, a great deal of care needs to be taken to ensure that the portions of the viral DNA which encode its virulence are not inserted into the host. Opponents of this method have cited the risks of effectively deliberately infecting an organism with a virus.



There is a third, cruder, method, often used in food plant GE, called the biolistic or gene gun method. This involves, in simple terms, firing pellets of the desired genetic material at plant cells. The technique has actually proved surprisingly successful at producing new crop strains.

Gene splicing- A very simplified diagram

PART2: The risks and opportunities of genetic engineering

Getting the facts right: The pros and cons of genetic engineering

Those who support the idea of GMOs point out that it is a technique of great potential for mankind. Crops can be engineered to be hardier and to produce higher yields, which can, they say, help to put an end to world hunger. The vitamin, starch or protein content of food crops can be increased to make them more healthful, more nourishing or more capable of being used for their intended purpose. Vegetables can also be engineered to last longer on the shelves.

In addition, micro-organisms can be engineered to produce vital substances such as insulin and vaccines and higher animals can be engineered to help medical science by isolating genes which can code for illnesses or, and this may be possible one day soon, by being genetically modified so that they can be used as organ donors in humans. The possibilities are limitless, the biochem scientists say.

But some scientists, and most environmentalists and consumer watchdogs have highlighted the problems so far, and noted the risks. GMO crops in particular, since they cannot be confined to a laboratory, and the foodstuffs they are used to produce have been opposed by those who criticise genetic engineering.

On the next few pages, there will be some attempt to look at both sides of each argument in the hope that one can shed some light on the debate and allow people to make an informed decision of their own.

Feeding the world

"(We object) strongly that the image of the poor and hungry from our countries is being used by giant multinational corporations to push a technology that is neither safe, environmentally friendly, nor economically beneficial to us. We do not believe that such companies or gene technologies will help our farmers to produce the food that is needed in the 21st century. On the contrary, we think it will destroy the diversity, the local knowledge and the sustainable agricultural systems that our farmers have developed for millennia and that it will thus undermine our capacity to feed ourselves."

Statement made to the United Nations by delegates from 24 African states backed by 30 development, farmer and environmental organisations

GM crops are often seen as a panacea by some scientists and many biotechnologists have suggested that GM foods can help to end world hunger. Monsanto claim to see it as one of their "global challenges" and their website claims that agriculture can help people "break the poverty trap". The text notes that Monsanto "are working to deliver the benefits of these tools to Africa, a continent that faces many challenges but which has great potential to reduce poverty and become self-sufficient in agriculture". But many communities and farmers and a number of charities and NGOs based in Africa remain unconvinced.

According to their own website, Monsanto also have "donated quality hybrid maize seed to farmers in Malawi. The cost to grow a ton of maize was $40: $7.50 for quality seed and $32.50 for fertilizer.[2] This comparison — spending $400 versus spending $40 — builds a compelling case for investment in agricultural productivity" (the $400 refers to "purchase and deliver a ton of maize to feed a family of six for one year).

Though this may seem like an act of charity, to others it may seem unethical because, by donating seed, biotech companies can make farmers dependent on their products. Monsanto's policy brings to mind the Nestle milk controversy of the 1980s and 1990s. In the 1990s, people all over the world boycotted Nestle due to the Swiss multinational's policy of donating baby

milk to hospitals in developing countries. Once mothers stopped breastfeeding their babies it was difficult to start again and they became dependent on expensive powdered milk. Baby milk contains none of the antibodies found in a mother's milk. It also needs to be mixed with water, which in some countries is often polluted or contaminated.

Regardless of the ethics of Monsanto's policy, it is worth noting that curing world hunger is not merely a matter of increasing agriculture efficiency (if indeed, it will be increased- some believe otherwise). The British Medical Association, in a statement also cited later in this report, noted that "there should be an end to assumptions that GM crops are necessary to feed the starving, given the complex food distribution, social and economic factors that lie behind such hunger".

The moral argument

There are those who find the very idea of genetic manipulation repugnant because they believe that playing around with genes is morally wrong, that biotechnologists are playing God. A European study shown later in this report revealed that many people consider genetic engineering fundamentally wrong and "unnatural". Many people believe that, regardless of the pros and cons of GE, regardless of whether GMOs are good or bad for you, GE is just plain wrong.

Genetics is a controversial science. Geneticists and biotechnologists have promised that they can help humanity, but possible advancements in genetics which will lead to prenatal selection based on genetic evidence or the use of genetics to choose a baby's sex will not be welcomed by all. The cloning of Dolly the sheep also signalled worrying times ahead for many. To scientists the development signalled the possibility of stem cell research- cloning could be used in the advancement of medical science. To some conservationists it suggested that species could be saved from extinction using cloning. To religious groups, the event was like the beginning of Armageddon- in the future it may be possible to clone humans, and the possibilities of this are endlessly intriguing and deeply frightening.

Biotechnologists have claimed that selective breeding (such as the creation of new dog breeds or new breeds of sheep) has been going on for millennia. They point out that clones already exist in this world in the form of identical twins. And they also point to an Old Testament text, making it difficult for the moralists and religious groups to answer back. Genesis, the first book of the Old Testament, refers to how God created the world and all living things in seven days. God says in Genesis "Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing".

Perhaps the moral dilemma comes not when considering the technology but its uses. Perhaps our morals will change somewhat over time or we will all become more accepting of the new technology. It is very difficult to condemn GMOs based on morality and religious scripture alone.

The costs and benefits to agriculture and the environment

In March 2005, the final trial of a large scale four year British study confirmed that GM crops can have environmental impacts. The study, which was the biggest of its kind ever undertaken, found that growing GM crops affected the natural food chain resulting in fewer weeds, but also fewer seeds, bees and butterflies.

According to the Department for the Environment, Food and Rural Affairs (DEFRA) the farm scale evaluations were undertaken by independent researchers to study the effect that the management practices associated with Genetically Modified herbicide tolerant crops might have on farmland wildlife, when compared with weed control used with non-GM crops.

Elliot Morely, the Environment Minister, noted that the trials demonstrate "the government's precautionary approach on GM crops and our firm commitment to case-by-case decisions are underpinned by sound scientific evidence". A spokeswoman for Friends of the Earth called the results "a major blow to the biotech industry" while a representative of the Soil Association, the organization which oversees organic farming standards in the UK noted that the results were "damning" because they showed that GM crops could seriously exacerbate the loss of wildlife.

But, in truth, the results were inconclusive: growing some GMOs may indirectly affect bee, butterfly and other insect populations, but growing others, it seems, does not. And it also depends on that farming practices are used and on what quantities of herbicides and pesticides might be used.

Though the study did not point this out, it would be reasonable to assume that using herbicide resistant strains "encourages" farmers to use herbicides and to use them in significant quantities (this was also a conclusion of one technical paper by BioTechInfo). Take the case of Monsanto (once again). The company has successfully created a double market for itself that will lead to heftier profits. Monsanto produces both the broad spectrum herbicide known as Roundup (which contains glyphosate) and also various seeds of crop plants that are resistant to this pesticide. Thus Monsanto can practically guarantee farmers that their fields will be free of weeds but that their crop will be unaffected so long as they use both the pesticide and the GM seed.

The use of Roundup Ready canola, soy and other seeds goes hand in hand with the extensive use of the pesticide. Farmers using transgenic seeds are encouraged to use increased amounts of Roundup. But there are some transgenic crops that require smaller doses of pesticides. One example is Bt Corn which contains the bacterial Bt protein, making it poisonous to pests such as the Corn Borer. Bt corn has been controversial: one study has shown it is toxic to the monarch butterfly (although critics of the study claim the experiment did not duplicate the natural conditions under which it may come into contact with monarch caterpillars. And, in 2000, one variety of Bt corn- Starlink, which was produced by Avensis- was found in Kraft's Taco Bell taco shells even though it had been approved for use in animal feed and not for human consumption. The EPA had concluded that Starlink did pose a mild allergen risk, and Avensis had reassured them that precautions would be taken to ensure that Starlink would not end up in food products. Somewhere along the chain, probably after harvesting, these precautions proved inadequate and, even though Avensis' variety represented just 1% of the total corn harvest, it may have contaminated as much as 50% of that harvest.

And a somewhat similar thing happened again. Most recently, an experimental and, as yet, unapproved variety of rice was found to have contaminated American rice supplies. The producer BayerCropHarvest responded to the class action lawsuit brought forward by hundreds of farmers from Arkansas and Missouri by producing a 30 page report that called the contamination an "act of God" and blamed "own negligence, carelessness and/or comparative fault."

The events pushed two of the world's biggest rice producing nations, Thailand and Vietnam, to reiterate their commitment to GM-free rice and led to Russia banning US rice imports.
GM rice has also been found in packets of rice in Cyprus, sold under the name Riceland. The company publicly came out and announced that Riceland Parboiled contained unauthorized GM rice and also suggested that consumers do not use the rice.

In the case of Strarlink, the corn was also found in Central and Latin America, not as a result of contamination through cross-pollination but because the US had sent food as aid to some of these countries (although GM corn has found its way to Mexican farmers' fields through cross pollination, despite a moratorium on GM crops). Sales of Starlink have since been discontinued.

Starlink was withdrawn despite no evidence showing it was harmful to human health (although there were suspicions) but the case is difficult as it is know without testing which foods are GM free and which are not. Roundup Ready, on the other hand, may well be hazardous to human

health, partly because of the glyphosate, but perhaps also because of the other ingredients used in the preparation of the pesticide. No significant cancer link has yet been found, despite the fact that many campaigners have pointed out to tenuous links revealed by studies, but there are certainly other toxic effects.

Roundup may be toxic to fish and has been found to be lethal to tadpoles if it finds its way to water courses. It irritates the eyes on contact but not the skin. In higher doses, ingestion may cause diarrhea. And, significantly, one study found that Roundup can inhibit steroidogenesis by disrupting the expression of a protein which controls testosterone production in males.

Because it is a powerful, broad spectrum herbicide, glyphosate is also lethal to wildflowers and other plants. And its use encourages the development of resistant strains of "superweeds" in the same way that antibiotics have been found to encourage the evolution of new strains of resistant bacteria or "superbugs".

Of course, the environmental and health impacts detailed above are not a direct result of growing one type of GM crop. But they do demonstrate that use of Roundup Ready and other pesticide resistant transgenic seeds can have an environmental impact (albeit an indirect one).

And there are more direct impacts of GM crops. The case of Percy Schmeiser, the Canadian farmer whose canola crop was contaminated by Roundup Ready seeds is documented elsewhere in this report. Contamination by GM seed can lead to serious problems and financial losses for farmers. In Schmeiser's case, this contamination came about as a result of spilt seed rather than cross-pollination, however.

But cross-pollination has been known to happen. We cannot stop bees from going from flower to flower. And bees do visit the flowers of GM crops (which has also led some conservationists to consider the effects of transgenes on bees and, by extension, on honey that may be used for human consumption).

A fear for farmers is that gene flow, the transfer of genetic material between populations (in this case fields of crops), can lead to traditional varieties being adulterated and lost. Farmers tend to save their seed for only a few years, usually planting the seed harvested in the previous year, and as a result varieties that they may have produced through selective breeding over a period of years may be lost.

There are also small risks of gene flow between species (this kind of horizontal gene transfer is discussed in the study on gene transfer in the human gut that has already been mentioned) and some scientists believe that this can lead to a mutation which can result in cancer. There is no evidence that eating GM foods can cause cancer (and no suggestion that growing them can do so) but it may pay to be wary.

The risks of contamination

There have been many verified cases of farmers' crops being contaminated with GM seeds and there have probably been many times more such incidents that were not recognized. Due to such contamination, it may be possible that much of the soy and canola being sold as GM-free or left unlabelled contains GMOs – only laboratory analysis can confirm this for certain.

The most widely documented case of such contamination is a case in Canada involving a farmer called Percy Schmeiser whose canola crop was contaminated by Monsanto's Roundup Ready canola, possibly from seeds flying off passing trucks. Monsanto a huge multinational that recently announced an annual revenue of $6 billion, took Schmeiser to court for patent infringement. The case begun in 1998 and shaped up in the media as a classic David-and-Goliath confrontation. The trial ended as a pyrrhic victory for Monsanto when the Supreme Court issued their decision in May.

The Court decided that Monsanto's patent was valid, but Schmeiser was not forced to pay Monsanto anything (Monsanto were demanding a $15/acre technology fee, amongst other things- their total demand was $400,000) as he did not profit from the presence of Roundup Ready canola in his fields. The court did not impose punitive damages on Schmeiser, as may have been expected in a patent infringement case, and the decision did not absolve Monsanto of responsibility for genetic contamination, or even consider that aspect. Though there are those who believe Schmeiser knowingly plant Roundup Ready seeds, the trial swung popular opinion in Canada against the multinational, whose aggressive methods have reportedly resulted in it launching hundreds of infringement cases against North American farmers (most of which had been settled out of court), and against GMOs.

Schmeiser still feels aggrieved. His legal bills are in the hundred of thousands of dollars and he has lost the right to use his strain of canola, which he says took him decades to develop, because he can not prove they do not include the Roundup Ready gene Monsanto patented.

And he wants to pursue the matter further. "If I would go to St. Louis and contaminate their plots--destroy what they have worked on for 40 years--I think I would be put in jail and the key thrown away," he has noted.

For organic farmers in the US, the issue of contamination is a key concern. Below is a list of suggestions (based on a similar list by James Riddle, an American organic farmer and policy analyst from Minnesota) on how organic farmers can minimize the risks of GMO contamination:

1. Know your seeds: Verify that only non-GMO seeds will be used by obtain statements from seed companies concerning the non-GMO status of the varieties to be planted. Make sure not to use genetically engineered legume inoculants.

2. Know your farm: Know your fields and determine which have the lowest risk of GMO contamination. Select isolated fields for wind and/or insect pollinated crops (corn, canola). Establish physical buffers, such as windbreaks and hedgerows.
3. Know your neighbours: Establish good lines of communication with neighbours, especially those who directly adjoin organic fields. Notify them that you are an organic farmer, and where your organic fields are located. Get to know farmers who farm adjoining fields, even if they rent the land.

4. Know your neighbours' crops: Gather information from neighbors, on the types of crops being grown in the vicinity. Know which GMO events are being planted

5. Know your equipment: Know what your equipment, including the rented, borrowed and second-hand equipment is used for and clean the equipment prior to use if necessary.

6. Know your harvest: Submit samples prior to harvest for GMO testing

7. Know your crop storage: Carefully inspect storage units prior to use. Dust from GMO crops can contaminate organic crops.

8. Know your truckers: Carefully inspect and clean trucks and trailers prior to loading with organic grain.

9. Know your records: Document your efforts to minimize GMO contamination. With good records, you will have a better chance of limiting losses, identifying causes of problems, and determining liability. Valid records of organic yields and sales may help establish claims for losses, should contamination occur.

10. Know your buyers: Know the contract specifications under which the organic crop is being grown. Communicate with buyers and organic certifying agents concerning GMO contamination issues.

The risks of using bacteria and viruses

This study has already looked at the use of plasmids in genetic engineering. Genetic material from viruses is also used and can be used to act as a promoter- switching on the transgene. The sequence (an expression cassette, as it can be known) begins with the promoter, is followed by the gene coding for the required characteristic and is ended by a terminator (not to be confused with so called "terminator genes" which may be engineered into GM crops in the future to ensure that farmers need to buy new seed each- a controversial notion).

Often, the three parts of the sequence will come from three different and unrelated species and will be engineered into the DNA of a fourth species. Sets of sequences may be used together, and one sequence usually codes for antibiotic resistance to enable organisms that have taken up the sequences to be selected through the use of antibiotics.

The use of viruses as promoters, in particular has been criticised. After all, the most commonly used promoters come from viruses that are associated with serious diseases or with plant diseases. The vectors will have their disease-causing capabilities disabled, but some researchers have suggested that this viral DNA can recombine with other DNA in the host genome, including other, dormant, viral DNA, with unpredictable results.

If horizontal gene transfer is indeed possible, then there could certainly be a risk in using bacterial plasmids and viral promoters in genetic engineering. Some say the promoters could act as carcinogens, even though the biotech industry says they are safe.

The science is a little cloudy but it may be an area where the precautionary principle needs to be considered.

PART 3

GMO PRODUCTS APPROVED UNDER DIRECTIVE 90/220/EEC

As of March 2001

Product	**Notifier**	**Date of Commission Decision Member State Consent**
1. Vaccine against Aujeszky's disease	Vemie Veterinär Chemie GmbH	18.12.92
2. Vaccine against rabies	Rhône-Mêrieux C/B/92/B28 & C/F/93/03-02	19.10.93
3. Tobacco tolerant to bromoxynil	SEITA C/F/93/08-02	08.06.94
4. Vaccine against Aujeszky's disease (further uses)	Vemie Veterinär Chemie GmbH C/D/92/I-1	18.07.94
5. Male sterile swede rape resistant to glufosinate ammonium (MS1, RF1) Uses : breeding activities	Plant Genetic Systems C/UK/94/M1/1	06.02.96
6. Soybeans tolerant to glyphosate Uses : import and processing	Monsanto C/UK/94/M3/1	03.04.96
7. Male sterile chicory tolerant to glufosinate ammonium Uses : breeding activities	Bejo-Zaden BV C/NL/94/25	20.05.96
8. Bt-maize tolerant to glufosinate ammonium (Bt-176)	Ciba-Geigy C/F/94/11-03	23.01.97
9. Male sterile swede rape tolerant to glufosinate ammonium (MS1, RF1) Uses : import and processing	Plant Genetic Systems C/F/95/05/01/A	06.06.97 (not finally approved by F)
10. Male sterile swede rape tolerant to glufosinate ammonium (MS1, RF2)	Plant Genetic Systems C/F/95/05/01/B	06.06.97 (not finally approved by F)
11. Test kit to detect antibiotic residues in milk	Valio Oy C/F1/96-1NA	14.07.97
12. Carnation lines with modified flower colour	Florigene C/NL/96/14	01.12.97 (MS consent)
13. Swede rape tolerant to glufosinate ammonium (Topas 19/2) Uses : import and processing	AgrEvo C/UK/95/M5/1	22.04.98
14. Maize tolerant to glufosinate ammonium (T25)	AgrEvo C/F/95/12/07	22.04.98
15. Maize expressing the Bt *cryIA(b)* gene (MON 810)	Monsanto C/F/95/12-02	22.04.98

16. Maize tolerant to glufosinate ammonium and expressing the Bt *cryIA(b)* gene (Bt-11) Uses : import and processing	Novartis (formerly Northrup King) C/UK/96/M4/1	22.04.98
17. Carnation lines with improved vase life	Florigene C/NL/97/12	20.10.98 (MS consent)
18. Carnation lines with modified flower colour	Florigene C/NL/97/13	20.10.98 (MS consent)

GMO PRODUCTS AUTHORISED UNDER DIRECTIVE 2001/18/EC

As of 31 January 2006

Product	**Notifier**	**Date of Commission Decision Member State Consent**
Maize Roundup Ready NK603, tolerant to glyphosate herbicide Uses : import and use in feed and industrial processing, *not for cultivation*	Monsanto C/ES/00/01	**Commission Decision 2004/643/EC of 19.07.04** notified under document number C(2004)2761
Maize - Zea mays L., line MON 863 - resistant to corn rootworm Uses : for import and use of grain and grain products, *not for cultivation*	Monsanto C/DE/02/9	**Commission Decision 2005/608/EC of 08.08.05** notified under document number C(2005)2950
Oil seed rape – herbicide resistant GT73 Uses : for import and uses in feed and industrial processing, *not for cultivation*	Monsanto C/NL/98/11	**Commission Decision 2005/635/EC of 31.08.05** notified under document number C(2005)3110 **Commission Recommendation (2005/637/EC)** of 16.08.05 notified under document number C(2005) 3073) (concerning the measures to be taken by the consent holder to prevent any damage to health and the environment in the event of the accidental spillage of an oilseed rape (Brassica napus L., GT73 line — MON-00073-7) genetically modified for tolerance to the herbicide glyphosate)
Maize herbicide and insect resistant (line 1507 -- CRY1F) Uses: import and processing, *not for cultivation*	Pioneer/ Mycogen Seeds C/NL/00/10	**Commission Decision 2005/772/EC of 03.11.05** notified under document number C(2005)4192
Maize MON 863 X MON 810 (protection against certain insect pests) Uses: for import and use of grain and grain products, *not for cultivation*.	Monsanto C/DE/02/9	**Commission Decision 2006/47/EC of 16.01.06** notified under document number C(2005)5980 NEW

THE SAFEGUARD CLAUSE

Below is article 23, also known as the safeguard clause, as found in 2001/18/EC. This clause was initially found as Article 16 in the older Directive 90/22/EEC. It is the clause that has been invoked (more than once in some cases) by Austria, Greece and other nations. The United Kingdom also invoked the clause, initially, but then withdrew its ban:

"Article 23

Safeguard clause

1. Where a Member State, as a result of new or additional information made available since the date of the consent and affecting the environmental risk assessment or reassessment of existing information on the basis of new or additional scientific knowledge, has detailed grounds for considering that a GMO as or in a product which has been properly notified and has received written consent under this Directive constitutes a risk to human health or the environment, that Member State may provisionally restrict or prohibit the use and/or sale of that GMO as or in a product on its territory.

The Member State shall ensure that in the event of a severe risk, emergency measures, such as suspension or termination of the placing on the market, shall be applied, including information to the public.

The Member State shall immediately inform the Commission and the other Member States of actions taken under this Article and give reasons for its decision, supplying its review of the environmental risk assessment, indicating whether and how the conditions of the consent should be amended or the consent should be terminated, and, where appropriate, the new or additional information on which its decision is based.

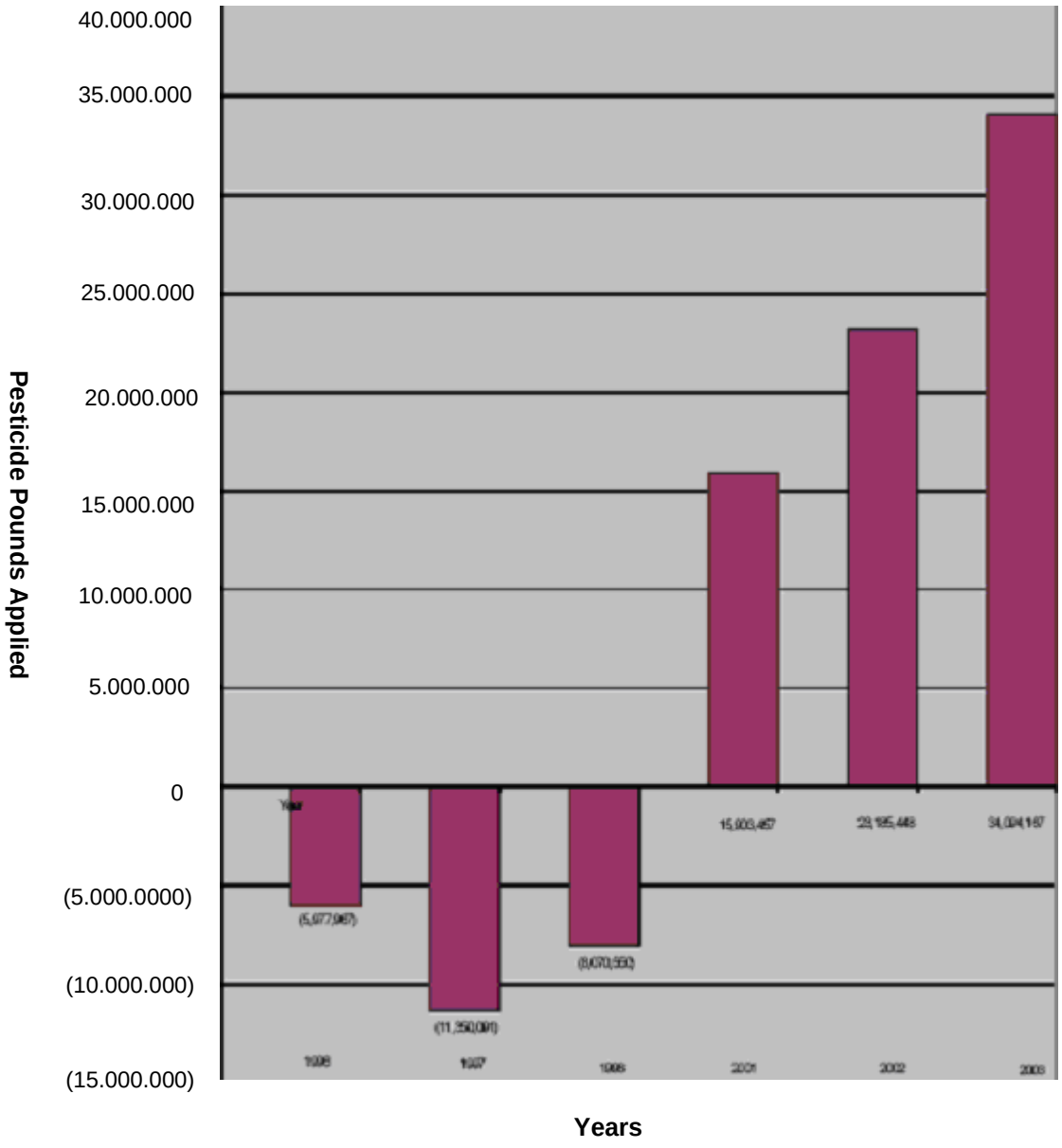
2. A decision shall be taken on the matter within 60 days in accordance with the procedure laid down in Article 30(2). For the purpose of calculating the 60-day period, any period of time during which the Commission is awaiting further information which it may have requested from the notifier or is seeking the opinion of the Scientific Committee(s) which has/have been consulted shall not be taken into account. The period of time during which the Commission is awaiting the opinion of the Scientific Committee(s) consulted shall not exceed 60 days.

Likewise, the period of time the Council takes to act in accordance with the procedure laid down in Article 30(2) shall not be taken into account."

PESTICIDE USE

Below is a chart showing the change in pesticide use over a period of eight years since GE were first grown in the US. In the first three years, fewer pounds of pesticide were applied per acre on GE crops than on conventional crops, but this has now markedly changed. The chart below is from BioTech InfoNet's report

Chart 2. Change in Pesticide Use in the First Three Years of Commercialization (1996-1998) Compared to the Last Three Years (2001-2003): Pounds Applied on GE Acres Compared to Conventional Acres



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