

Annex:

- Annex 1: Federal Structure of Germany (Laenders)**
- Annex 2: List of Persons contacted in Germany**
- Annex 3: Literature / Sources**
- Annex 4.1: Cultivation Area of Selected Crops in Germany (1000 ha)**
- Annex 4.2: Production of Selected Crops in Germany (1000 t)**
- Annex 5: Additional Information about German Agriculture**

Annex 1: Federal Structure of Germany (Laenders)



Annex 2: List of Persons Contacted on National Level
(without the contacts already listed in the regional reports)

Bundesministerium für Verbraucherschutz, Ernährung und Landwirtschaft, Bonn

Herr Maaß
Herr Kullmann
Dr. Bohlen

Bundesamt für Ernährung und Landwirtschaft, Frankfurt a.M.

Frau Hahnel

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, Bonn

Frau Dr. Schreiner-Bobis
Dr. Delbrück

UFOP (Union zur Förderung von Öl- und Proteinpflanzen), Bonn

Frau Dr. Specht

Bundesamt für Naturschutz, Bonn

Dr. Blab
Dr. Klein
Herr Sauerborn
Frau Robine

Deutscher Bauernverband e.V., Berlin

Dr. Heim

Industrie Verband Agrar e.V., Frankfurt am Main

Herr Pradt

Fachhochschule Weihenstephan - Triesdorf

Fachbereich Umweltsicherung, Weidenbach-Triesdorf

Prof Dr. Asmus

**Bayerische Landesanstalt für Bodenkultur und Pflanzenbau,
Sachgebiet Agrarfauna und Vogelwelt, Weidenbach-Triesdorf**

Dr. H. Ranftl

Deutscher Verband für Landschaftspflege e.V. (DVL), Ansbach

Frau Tschunko
Herr Dieter Speer

Annex 3: Literature / Sources
(without the Literature / Sources already listed in the regional reports)

Bundesamt für Naturschutz (BfN) Skripten 31: Zukunft des Vertragsnaturschutzes, Neue Konzepte zur Kooperation von Naturschutz und Landwirtschaft. Bonn 2000.

Bundesamt für Naturschutz (BfN) Skripten 33: Naturschutzrelevante Produktions- und Vermarktungskriterien ausgewählter Regionalprodukte. Bonn 2001.

Bundesministerium für Ernährung, Landwirtschaft und Forsten/ für Verbraucherschutz, Ernährung und Landwirtschaft: Agrarbericht der Bundesregierung. Bonn/Berlin, versch. Jahrgänge.

Bundesministerium für Ernährung, Landwirtschaft und Forsten: Agenda 2000, Pflanzlicher Bereich, Agrarumweltmaßnahmen. Bonn, Januar 2000.

Bundesministerium für Ernährung, Landwirtschaft und Forsten: Die europäische Agrarreform, Pflanzlicher Bereich, flankierende Maßnahmen. Bonn, Januar 1996/ Januar 1997.

Bundesministerium für Ernährung, Landwirtschaft und Forsten: Die europäische Agrarreform, Tierprämien, Getreide, Ölsaaten, Eiweißpflanzen, Flächenstilllegung, Nachwachsende Rohstoffe, Flankierende Maßnahmen. Bonn, Januar 1995.

Bundesministerium für Ernährung, Landwirtschaft und Forsten: Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten. Münster, versch. Jahrgänge.

Deutscher Bauernverband: Argumente 2001, Trends und Fakten zur wirtschaftlichen Lage der deutschen Landwirtschaft. Bonn, Dezember 2000.

KTBL (Kuratorium für Technik und Bauwesen in der Landwirtschaft e.V.): Betriebsplanung 1999/2000, Datensammlung 16. Auflage. Darmstadt 1999.

KTBL (Kuratorium für Technik und Bauwesen in der Landwirtschaft e.V.): Standarddeckungsbeiträge 1999/2000, Datensammlung 24. Auflage. Darmstadt 1999.

Lechner, Martin: Einfluss verschiedener Begrünungen auf die Verunkrautung in der Rotationsbrache und Folgekultur. Stuttgart, 1995.

Poggensee, Kay: Die Flächenstilllegung der Europäischen Gemeinschaft: Analyse und Beurteilung. Pinneberg-Waldenau, 1993.

Stahr, K., Jahn, R., Billen, N., Lehmann, A. & Sommer, M.: Veränderung des Nährstoffhaushalts landwirtschaftlich genutzter Böden durch die Flächenstilllegung. Mitteilungen der Deutschen Bodenkundlichen Gesellschaft., 72/II, 1459-1462, 1993.

Statistisches Bundesamt: Bevölkerungsstruktur und Wirtschaftskraft der Bundesländer, Ausgabe 2000, Wiesbaden, März 2000.

Statistisches Bundesamt: Statistisches Jahrbuch für die Bundesrepublik Deutschland. Wiesbaden, Jahrgänge 1985 – 2000.

UFOP (Union zur Förderung von Öl- und Proteinpflanzen): Bericht 1999/2000. Bonn, Juli 2000.

Universität Hohenheim, Institute 360 (Phytophysics): Flächenstilllegung - Auswirkungen auf das Auftreten von Schadorganismen. Hohenheim, 1997.

Walter, Ute; D. Hermann und K. Hurler: Flächenstilllegung - Auswirkungen der Rotationsbrache auf Schnecken, Nematoden und Getreidefußkrankheiten. Gesunde Pflanzen, 45. Jahrg., Heft 6, S. 207-216; 1993.

ZMP Zentrale Markt und Preisberichtsstelle GmbH: ZMP-Bilanz Getreide – Ölsaaten – Futtermittel. Bonn, Jahrgänge 1985 – 1999.

Annex 4.1: Cultivation Area of Selected Crops in Germany (1000 ha) - 1985 until 1989 West Germany only

Area (1.000 ha)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Winter wheat	1.537	1.556	1.590	1.668	1.714	2.371	2.373	2.522	2.324	2.352	2.530	2.544	2.648	2.746	2.440
Spring wheat	87	92	59	64	50	49	64	61	61	72	42	43	65	45	149
Hard wheat			22	11	13	10	16	16	10	11	7	8	7	12	12
Wheat	1.624	1.648	1.671	1.743	1.777	2.430	2.453	2.598	2.395	2.435	2.579	2.594	2.720	2.802	2.601
Rye	426	414	412	378	382	1.055	711	615	662	723	861	809	843	936	748
Winter meslin	12	11	11	11	10	12	9	11	10	11	10	11	12	10	9
Bread grain in total	2.062	2.073	2.094	2.133	2.169	3.497	3.173	3.224	3.066	3.168	3.451	3.415	3.575	3.749	3.358
Winter barley	1.189	1.266	1.221	1.110	1.064	1.699	1.519	1.499	1.463	1.291	1.447	1.413	1.422	1.502	1.370
Spring barley	760	681	629	726	682	913	1.016	909	738	779	662	795	852	678	841
Barley	1.949	1.947	1.850	1.836	1.746	2.613	2.535	2.408	2.201	2.070	2.109	2.208	2.274	2.181	2.210
Oat	584	506	459	474	419	473	380	358	359	392	309	302	312	264	268
Spring meslin	108	99	82	71	67	61	59	54	48	52	45	46	47	38	41
Tricale			18	20	29	77	130	175	219	208	289	364	438	469	386
Feed- and industrial grain	2.642	2.552	2.409	2.401	2.261	3.223	3.104	2.995	2.826	2.722	2.751	2.920	3.071	2.952	2.906
Grain maize	181	187	121	129	131	151	194	209	240	250	231	277	266	251	274
CCM			73	70	78	77	89	87	91	96	94	95	103	90	97
Cereal in total	4.884	4.812	4.697	4.734	4.639	6.948	6.560	6.514	6.224	6.235	6.527	6.707	7.014	7.042	6.635
Field peas	3	4	51	29	20	24	23	29	44	45	64	87	119	169	164
Field beans	14	28	54	60	47	38	24	18	22	30	25	21	26	26	23
Other leguminosae	17	37	6	6	6		11	10	20	20	33	40	39	30	25
Early potatoes	22	20	21	19	20	35	25	25	22	19	21	21	18	16	18
Late potatoes	198	189	185	180	180	514	317	336	290	275	295	315	286	281	290
Potatoes in total	220	210	206	199	201	548	342	361	312	293	315	336	304	297	309
Sugar beets	403	390	376	379	383	608	554	534	522	500	513	516	504	503	489
Feeding beets	102	94	85	73	64	93	53	46	35	25	23	20	17	14	11
Winter rape	256	297	421	374	418	707	933	921	947	950	932	777	858	959	1.150
Spring rape	9	10	8	10	19	13	17	80	60	107	42	76	56	49	48
Rape in total	266	308	428	385	429	720	950	1.001	1.007	1.058	974	854	914	1.007	1.198
Grain sunflowers											52	44	34	34	33
Clover	153	157	151	150	151	302	269	243	238	244	235	227	227	217	201
Lucerne	28	27	25	23	19	154	110	75	67	61	49	44	37	36	32
Permanent grassland	3.387	3.365	3.340	3.316	3.364	3.785	3.952	3.957	4.011	4.063	4.107	4.140	4.140	4.185	5.114
Ley farming	105	117	98	99	96	400	239	206	227	212	212	220	234	228	225
Silage maize	932	947	938	931	924	1.365	1.309	1.243	1.264	1.205	1.252	1.326	1.294	1.235	1.203

Annex 4.2: Production of Selected Crops in Germany (1000 t) - 1985 until 1989 West Germany only

Production (1.000 t)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Winter wheat	9.422	9.954	9.549	11.515	10.722	14.949	16.184	15.196	15.393	16.040	17.513	18.623	19.429	19.878	18.650
Spring wheat	444	453	382	341	244	246	348	276	327	383	213	252	364	249	901
Hard wheat				66	66		80	69	46	58	38	47	34	60	65
Wheat	9.866	10.406	9.931	11.922	11.032	15.242	16.612	15.542	15.767	16.481	17.763	18.922	19.827	20.187	19.615
Rye	1.821	1.768	1.599	1.579	1.797	3.988	3.323	2.422	2.984	3.451	4.521	5.214	4.580	4.775	4.329
Winter meslin	55	50	46	54	48		46	50	47	52	51	60	65	54	47
Bread grain in total	11.742	12.224	11.576	13.556	12.878	19.287	19.981	18.015	18.797	19.983	22.336	23.196	24.472	25.017	23.991
Winter barley	6.351	6.537	6.090	6.471	6.998	9.810	9.370	8.585	7.500	7.535	9.042	7.926	9.239	9.203	9.026
Spring barley	3.339	2.840	2.481	3.117	2.718	4.182	5.124	3.611	3.506	3.368	2.849	4.148	4.160	3.309	4.275
Barley	9.690	9.377	8.571	9.587	9.716	13.992	14.494	12.196	11.006	10.903	11.891	12.074	13.399	12.512	13.301
Oat	2.806	2.276	2.008	2.039	1.534	2.105	1.867	1.314	1.731	1.663	1.420	1.606	1.599	1.279	1.339
Spring meslin	471	411	398	296	255	255	272	204	211	210	179	220	207	171	190
Tricale				99	157	389	717	890	1.147	1.125	1.643	2.128	2.621	2.814	2.374
Feed- and industrial grain	12.968	12.064	10.977	12.021	11.662	16.741	17.350	14.605	14.094	13.900	15.133	16.027	17.825	16.777	17.204
Grain maize	1.204	1.302	1.217	1.535	1.573	1.552	1.937	2.139	2.656	2.446	2.395	2.913	3.188	2.781	3.257
Cereal in total	25.915	25.590	23.770	27.112	26.113	37.580	39.268	34.758	35.547	36.329	39.864	42.136	45.486	44.575	44.452
Field peas	11	15	147	103	69	77	75	74	134	151	216	301	400	589	610
Field beans	55	106	195	217	166	135	86	56	83	91	86	78	92	94	96
Early potatoes	630	556	594	569	585	867	597	650	660	518	565	645	541	477	561
Potatoes in total	7.276	6.835	6.242	6.864	6.866	13.172	9.604	10.247	11.600	9.151	9.334	12.454	11.119	10.860	11.008
Total potatoes	7.905	7.390	6.836	7.434	7.451	14.038	10.201	10.897	12.260	9.669	9.898	13.100	11.659	11.338	11.568
Sugar beets	20.813	20.260	19.049	18.590	20.767	30.600	25.926	27.150	28.606	24.211	26.049	26.064	25.769	26.940	27.569
Feeding beets	10.810	9.798	8.934	7.587	6.570	7.314	4.414	4.339	3.694	2.336	2.168	1.980	1.660	1.331	1.040
Winter rape	782	946	1.248	1.192	1.425	2.058	2.933	2.523	2.735	2.737	3.024	1.836	2.760	3.290	4.181
Spring rape	21	23	17	24	25	30	39	94	113	159	79	134	107	98	104
Rape in total	803	969	1.265	1.216	1.450	2.088	2.972	2.617	2.848	2.896	3.103	1.970	2.867	3.388	4.285
Grain sunflowers											111	103	85	85	84
Clover	1.300	1.336	1.297	1.312	1.295	2.919	2.322	2.127	2.267	2.129	2.144	2.016	2.030	1.993	1.857
Lucerne	241	240	222	202	156	1.481	911	592	637	529	428	378	320	311	268
Permanent grassland	27.364	26.870	27.179	27.847	27.779	30.413	30.328	29.923	33.330	32.469	32.911	32.397	32.896	34.614	33.738
Ley farming	924	996	853	911	841	3.687	2.012	1.504	2.103	1.837	1.874	1.808	1.990	2.032	1.967
Silage maize	44.387	45.427	40.858	45.702	44.815	55.222	52.067	49.229	59.436	47.693	49.490	57.657	56.844	54.328	52.434

Annex 5: Additional Information about German Agriculture

Figure 1: Farms by Farming systems 1999 in %¹

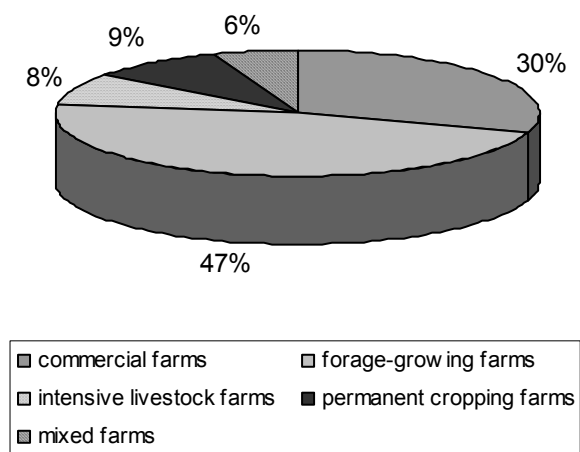
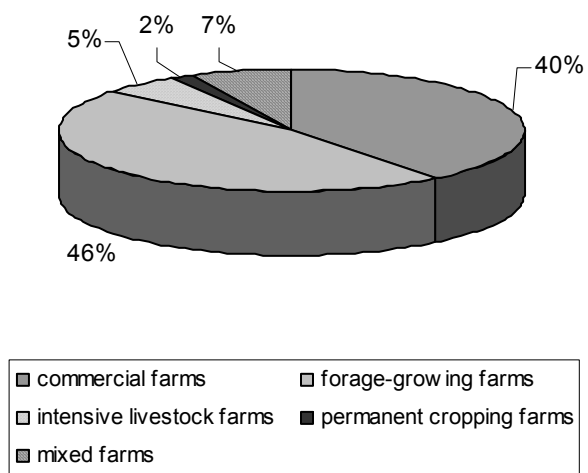


Figure 2: Share of Agricultural Area by Farming system 1999 in %²⁷



¹ See Statistisches Jahrbuch über Ernährung Landwirtschaft und Forsten, 1999.

Figure 3: Agricultural Utilized Area (UAA) by Farm Size Classes ²

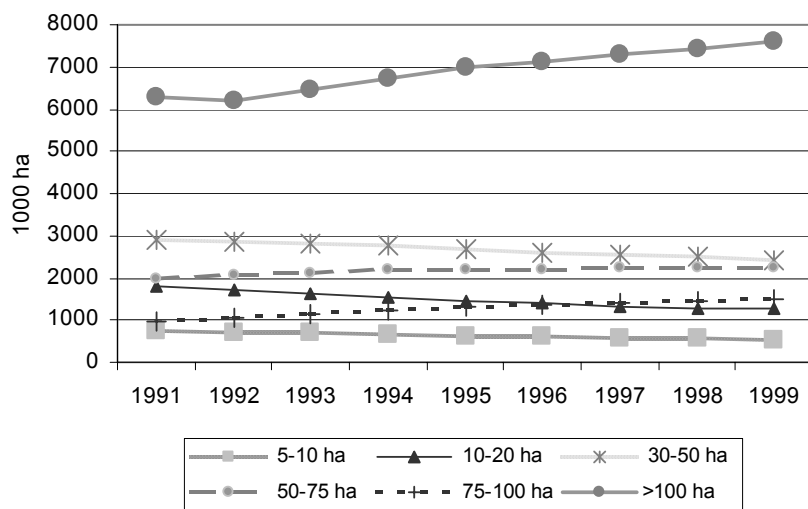


Figure 4: Development of Price-Index for Fertilizers and Plant Protection Means

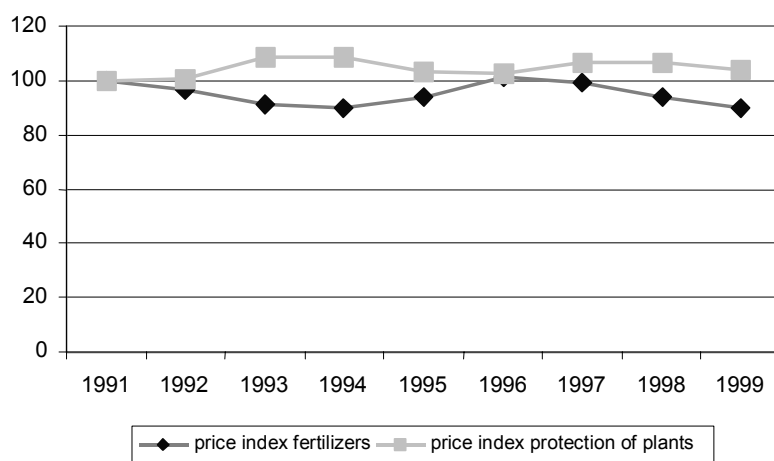
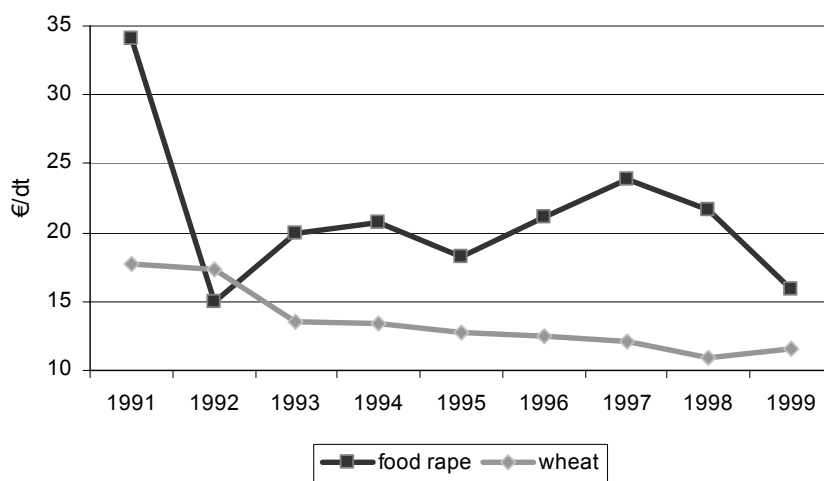


Figure 23: Development of farm prices for wheat and rape³



² See Statistisches Jahrbuch über Ernährung Landwirtschaft und Forsten, different volumes.

³ See ZMP Getreide-Ölsaaten-Futtermittel, different volumes; prices respective on to December

Annex 6: Environmental Impacts of Land Set aside – Selection of German Bibliography

1. Selection of sources

The search of sources dealing with environmental impacts of land set aside was conducted in three steps:

- Direct contacts to German Agricultural Universities; information about related research projects;
- Search of literature within the Online Public Access Catalogue (OPAC) which comprises the vast majority of available books and magazines in the Bavarian libraries;
- Detailed search of sources in the library of the Fachhochschule Weihenstephan (University of Applied Sciences Weihenstephan).

The following hints on literature do provide only a short extract out of a larger number of publications. Short abstracts about the content of the contributions were attached, if available

2. Main Research Issues

At the beginning of the set aside policy, research was concentrated primarily on the selection/ definition of appropriate cultivation techniques for set aside areas and their ecological effects. In a later stage the long-term effects of set aside and its influence on soil structure, the nitrogen dynamics in the soil and the effects on flora and fauna found a stronger interest. Also economic questions played a role. Generally the extent of research related to land set aside increased with the introduction of the obligatory set aside scheme (1992/1993).

After the set aside programme became more and more an integrated part of the general agricultural policy, the scientific interest in its effects obviously decreased. Therefore, actual publications concerning the environmental impacts are hardly available.

In total, the selected sources can be assigned to the following categories:

- (1) Impact of land set aside on the nutrients balance of soils; risks of nutrient losses/erosion on set aside areas;
- (2) Changes of soil structure and humification/formation of humus;
- (3) Changes of the dynamics of vegetation and plant communities; impacts on the ecology of landscapes;
- (4) Appearance of plant parasites and pests on set aside areas;
- (5) Changes of animal species on set aside areas (e.g. earthworms, locusts, game);
- (6) Economic impacts of land set aside, partly linked with ecological aspects.

3. Selected Sources

- (1) **Impact of land set aside on the nutrients balance of soils; risks of nutrient losses/erosion on set aside areas**

Kersebaum, Christian: Stoffdynamik stillgelegter landwirtschaftlicher Flächen. Risikoabschätzung im Vergleich zur intensiven Nutzung aus Sicht des Bodenschutzes. Forschungsbericht 107 02 004/03, Berlin (Umweltbundesamt) 1993.

GKSS-Forschungszentrum: Der Einfluss von Flächenstilllegung und Extensivierung auf den Stickstoffaustrag mit dem Stickerwasser, 1993.

Junge, A., Stober, C., Marschner, H. : Auswirkungen der Flächenstilllegung auf den Stickstoffhaushalt der Böden. In: Sonderdruck aus: Agrarbiological Research, Band 46 (1993), Heft, S. 112-119 (abstract see chapter 4).

Kleine, K.: Auswirkungen einer mehrjährigen Flächenstilllegung, einer Rotationsbrache und einer praxisüblichen Fruchtfolge auf Stickstoffumsatz, auf die Nitratauswaschung, auf den Wasser- und Nährstoffhaushalt auf drei grundwassernahen Standorten Nordwestdeutschlands. Oldenburg 1995.

Marschner, Horst: Auswirkung von Flächenstilllegung auf die Stickstoffdynamik im Boden. Institute 330 (Plant Nutrition), Universität Hohenheim 1997.

Koehn, Detlev: Dynamik von Nitrat und anderen Nährstoffen: chemische und mikrobiologische Grundlagen, Analysen von Probeflächen unter Brache und extensiv genutzten Flächen sowie Überlegungen zum Grundwasserschutz durch Flächenstilllegung, Wardenburg 1998.

(2) Changes of soils structure and humification/formation of humus

Becher, H. : Ist Flächenstilllegung von Äckern aus bodenkundlicher Sicht sinnvoll? Deutsche Bodenkundliche Gesellschaft, Arbeitsgruppe Bodenschutz, Oldenburg 1992.

Billen, Norbert: Standortsabhängigkeit der Bodenveränderungen durch Brachlegung (Flächenstilllegung) von Äckern in Südwestdeutschland. Hohenheimer Bodenkundliche Hefte, Heft 37. Universität Hohenheim, Institut für Bodenkunde und Standortslehre, Stuttgart 1996.

Jahn, R.: Überprüfung der Umweltverträglichkeit bei Flächenstilllegung, Institut für Bodenkunde und Standortlehre, Universität Hohenheim 1997 (abstract see chapter 4).

(3) Changes of the dynamics of vegetation and plant communities; impacts on the ecology of landscapes

Arbeitsgemeinschaft Beruflicher und Ehrenamtlicher Naturschutz: Flächenstilllegung und Extensivierung für Naturschutz. (Referate, Ergebnisse und Dokumentation eines Seminars vom 07-09.10.1987 in Rendsburg). Greven 1988.

Wilstacke, Ludger: Erprobung der Flächenstilllegung in Niedersachsen – Inanspruchnahme und Wirkungen des niedersächsischen Grünbracheprogramms 1987/88, Münster-Hiltrup 1989.

Dierßen, K.: Extensivierung und Flächenstilllegung – Naturschutzkonzepte in der Agrarlandschaft im Widerstreit zwischen Pflegenutzung und spontaner Entwicklung. In: Landesnaturschutzverband Schleswig-Holstein (Hrsg.), Grüne Mappe S. 18-24, Kiel 1998.

Schmidt, W. & Waldhardt, R.: Welchen Beitrag liefern Flächenstilllegung und Extensivierung zum Artenschutz- und Biotopschutz in der Agrarlandschaft? In: MAHN, E.-G. & TIETZE, F. (Hrsg.): Agro-Ökosysteme und Habitatinseln in der Agrarlandschaft. Wiss. Beiträge, Martin Luther-Universität Halle-Wittenberg 1991, S. 169-182.

Institut für Bodenkunde und Bodenerhaltung der Universität Giessen: Ökologische Begleituntersuchungen zu Flächenstilllegung. Giessen 1991.

Forche, Thomas: Pflanzenbauliche und landschaftsökologische Auswirkungen stillgelegter Flächen, Münster 1993 (abstract see chapter 4).

Waldhardt, R.: Flächenstilllegungen und Extensivierungsmaßnahmen im Ackerbau - Flora, Vegetation und Stickstoff-Haushalt. Siegen 1994.

Schmiedeknecht, Alrun: Untersuchungen zur Auswirkung von Flächenstillegung auf die Vegetationsentwicklung von Acker- und Grünlandbrachen im Mitteldeutschen Trockengebiet. Berlin 1995 (abstract see chapter 4).

Alfred Toepfer Akademie für Naturschutz: Flächenstillegung und Extensivierung in der Agrarlandschaft - Auswirkungen auf die Agrarbiozönose. NNA-Bericht, Band 9 (1996), Heft 2.

Oesau, Albert: Zur Flora und Vegetation von Rotationsbrachen und deren Folgekulturen. Landesanstalt für Pflanzenbau und Pflanzenschutz, Mainz 1999.

(4) Appearance of plant parasites and pests on set aside areas

Walter, U., Hermann, D., Hurle, K.: Flächenstillegung - Auswirkungen der Rotationsbrache auf Schnecken, Nematoden und Getreidefußkrankheiten. Gesunde Pflanzen, 45. Jahrg., Heft 6 (1993), S. 207-216.

Bischoff, A., Mahn, E.-G.: Strukturwandlung von Agrophytozönosen auf N-Hochlastflächen bei extensiver agrarischer Nutzung. Zeitschrift für Pflanzenkrankheiten, Pflanzenschutz, Sonderheft 14 (1994), S. 65-74.

Lechner, Martin: Einfluss verschiedener Begrünungen auf die Verunkrautung in der Rotationsbrache und Folgekultur, Stuttgart 1995 (abstract see chapter 4).

Universität Hohenheim, Institute 360 (Phytomedicine): Flächenstillegung - Auswirkungen auf das Auftreten von Schadorganismen, Hohenheim 1997.

Content:

At various sites in Baden-Wuerttemberg the effects of different kinds of rotational set aside on the occurrence of plant and soil parasites has been analysed. The research aimed at the development of management techniques which minimize the potential risks of plant pests in the upcoming cultivation period.

(5) Changes of animal species groups on set aside areas (e.g. earthworms, locusts, game)

Groeblinghoff, Franz Ferdinand: EU-Flächenstillegung: Chance für Niederwild und Natur. Deutscher Jagdschutz-Verband, Bonn 1995.

Kohlmann, T., d. Glandt, H. Mattes: Zur Heuschreckenfauna junger Ackerbrachen in der Westfälischen Bucht. Ein Beitrag zur Bewertung der Flächenstillegung aus tierökologischer Sicht. Metelener Schriftenreihe für Naturschutz, Heft 5 (1995), S.51-58.

Kohlmann, T., d. Glandt, H. Mattes: Zur Wanzenfauna junger Ackerbrachen in der Westfälischen Bucht: Ein Beitrag zur Bewertung der Flächenstillegung aus tierökologischer Sicht. Metelener Schriftenreihe für Naturschutz, Heft 5 (1995), S.59-74.

Ehrmann, Otto: Einfluss von Nutzungsänderungen auf Regenwürmer in Ackerböden. Institut für Bodenkunde und Standortlehre der Universität Hohenheim, 1997.

Content :

Taking areas out of production affects the earthworm fauna of the respective plots. In which way these effects occur depends particularly on the cultivation of the areas. Within Baden-Württemberg, at five sites with different conditions of soils and climate the earthworm population was counted at several times during each year of research. Especially the immigration of earthworms into set aside areas was considered. In addition, changes of soil structure resulting from changed densities of earthworms became analysed.

Basesow, Thies: Vergleichende Bewertung der ökologischen Folgen der Flächenstilllegung gezeigt an Laufkäfern (Carabidae) und Schwebfliegen (Syrphidae), Giessen 1988 (abstract see chapter 4).

(6) Economic impacts of land set aside, partly linked with ecological aspects

Henze, Arno: Bewertung von Flächenstilllegungen. Vergleichende Nutzen-Kosten-Bewertung von Betriebsstilllegungen und Teilflächenstilllegungen. Münster-Hiltrup, 1988.

Clausen, Nicolaus-Erik: Akzeptanz von Flächenstilllegungsmaßnahmen; Hamburg 1989.

Stegmann, Peter: Auswirkungen von Flächenstilllegungen: bisherige Erfahrungen und ökonomische Analysen am Beispiel Niedersachsens, Kiel 1992.

Maier, Karsten: Ökonomische Bewertung der Flächenstilllegung in Baden-Württemberg, 1993.

Poggensee, Kay: Die Flächenstilllegung der Europäischen Gemeinschaft: Analyse und Beurteilung. Pinneberg-Waldenau 1993 (abstract see chapter 4).

Weinschenck, Günther: Natur- und Umweltschutz mit produktionssenkenden Maßnahmen. Institut 410 (Farm Management) der Universität Hohenheim, 1997.

Content:

Measures aiming at the reduction of production like extensification of cultivation and land set aside can generally be used for the protection of nature and environment, too. However, these measures were directed up to now more or less exclusively towards the lowering of production. The research demonstrates the context in which production and environmental related targets can be realized simultaneously.

Weinschenck, Günther: Einzelbetriebliche Auswirkungen der Flächenstilllegung. Institute 410 (Farm Management), Universität Hohenheim, 1997.

Chatzis, Andreas: Flächenbezogene Ausgleichszahlungen der EU-Agrarreform – Pachtmarktwirkungen und Quantifizierung der Überwälzungseffekte, Holm 1997.

4. Short summary of selected sources concerning the environmental effects of land set aside

Basesow, Thies: Vergleichende Bewertung der ökologischen Folgen der Flächenstilllegung gezeigt an Laufkäfern (Carabidae) und Schwebfliegen (Syrphidae), Giessen 1988.

The five-year (voluntary) land set aside programme was examined in Hessen at different natural sites comparatively. Ground beetles (carabidae) and hoverflies (syrphidae) served as indicators. As a result it was stated that extensively used areas, particularly in mountainous regions, proved to be more favourable for the preservation of biodiversity than set aside areas.

Junge, A., Stober, C., Marschner, H. : Auswirkungen der Flächenstilllegung auf den Stickstoffhaushalt der Böden. In: Sonderdruck aus: Agrarbiological Research, Band 46 (1993), Heft, S. 112-119.

Phacelia generally shows positive effects within crop rotation. Nevertheless, its late cultivation can not prevent an increase of nitrogen in soils and/or nitrate erosion. Natural regrowth and the sowing of specific grass seeds reduce the nitrate input on set aside areas.

Poggensee, Kay: Die Flächenstilllegung der Europäischen Gemeinschaft: Analyse und Beurteilung. Pinneberg-Waldenau 1993

The study from 1992 refers to the voluntary set aside (before 1992) and to the just implemented compulsory set aside programme, too. Economic effects of the programme are in the foreground. Regarding ecological effects, the following results are quoted:

As a result of land set aside, negative ecological effects often occur on the areas not set aside. The essential cause for that must be seen in the intensification of cultivation on the remaining plots.

Compared to areas under production, the ecological effects of land set aside on set aside plots can be positive or negative:

- As far as positive effects occur, they are mostly temporary. They above all result from improved living conditions for animals and plants.
- Negative effects result primarily from the recultivation of long-term set aside areas; recultivation destroys an existing ecological system.

Compared to the set aside scheme, the extensification of cultivation on the entire agricultural area would show considerably higher ecological effects.

Forche, Thomas: Pflanzenbauliche und landschaftsökologische Auswirkungen stillgelegter Flächen. Münster 1993

The author examined different kinds of regrazing on set aside areas with regard to their effects on soil, water economy, flora, fauna, and onto the landscape. The results were achieved on experimental fields in Niedersachsen. Conclusions:

A novel living space results through land set aside. The ecological effects above all depend on the following decisions:

- Soil management during the transitional period between cultivation and land set aside as well as between set aside and the further cultivation;
- Selection of regrazing techniques by the farmers.

On the other hand, the duration of set aside obviously plays only a subordinate role.

The field research on different sites allow an ecological evaluation of regrazing techniques:

- Complete fallow and regrazing of set aside areas exclusively in spring should be refused since the stress resulting from soil and nutrients erosion exceeds the respective negative effects of a regular cultivation.
- Regrazing during the entire summer, natural regrazing after a winter crop, regrazing during summer with plants which freeze off in the winter can be recommended to a limited extend only;
- A continuously one year or several years' regrazing (natural regrazing or sowing of specific seeds) as well as the seed of durable underseeds which form a soil coverage immediately after the harvest of the main crop are to be recommended.

The cultivation of leguminosae on set aside areas should be admitted in a conditional manner only. In this case it should be required:

- Ploughing up of those areas in spring after the harvest of the crops;
- Orientation of the cultivation of leguminosae at soil quality; on fertile sites only a small share respectively no leguminosae should be cultivated;
- Integration of the nutrient delivery through leguminosae into the nutrients balance of the farms.

In the course of decision taking about the type of set aside, the location of the set aside plots should be taken into account. As longer areas are taken out of production, as more their magnetic effect on animal species increases, which on arable areas under regular cultivation may not exist. This magnetic effect becomes the stronger the less attractive the structure of the surrounding areas (for wild species) occurs. Therefore, long term set aside should be organized preferably in the kind of enlarged edges in the neighbourhood of forests, nature reserves, waters or other areas with specific value for nature. In

regions with favourable natural conditions for farming in which set aside plots mostly border to productive arable areas, the rotational set aside is to be recommended.

Schmiedeknecht, Alrun: Untersuchungen zur Auswirkung von Flächenstilllegungen auf die Vegetationsentwicklung von Acker- und Grünlandbrachen im Mitteldeutschen Trockengebiet. Berlin 1995.

As part of an experimental programme the kind and speed of natural succession on permanent fallow arable areas and on grassland was examined in central German dry areas. Results:

Land set aside can contribute to the improvement of soil structure and the increase of bio-diversity above all in areas with large-scale farming as e.g. in the central German dry areas with fertile soils. On those nutrient rich soils maintenance works are recommended for the lowering of the nutrient status.

On nutrient rich fallow land, few kinds dominate the crop and prevent at least in the initial stage of a natural succession the evolution of less competitive species as well as the growth of woods. For the preservation of so called "vegetal-species" (e.g. cornflower, corn poppy) a short-term set aside or the participation in a field margin programme may provide more advantages than a long-term fallow, since they correspond more closely with the life-cycle of those plants and their demands on the conditions of location.

Lechner, Martin: Einfluss verschiedener Begrünungen auf die Verunkrautung in der Rotationsbrache und der Folgekultur. Stuttgart 1995.

At four typical sites (arable areas) in Baden-Wuerttemberg, the influence of different kinds of regrazing fallow land on weed infestation was examined both during the rotational set aside periode and during the cultivation of the following crop (winter wheat, rye). Parallel to the field experiments similar experiments were carried out in glasshouses; additionally, the nitrate input in the soils was counted at the beginning and the end of the set aside periode. Results:

- The management of the plots is decisive for the environmental effects of land set aside.
- The number of species on the four sites hardly distinguished. In the case of natural regrazing, the number of species was only insignificantly higher compared to the regrazing with specific seeds. In total, natural regrazing obviously support the development of a high number of species more than other techniques since specific seed compounds hardly contain weeds.
- In the case of natural regrazing the weed density remained approximately constant. Using specific seed compounds, however, weed density was reduced clearly. Especially positive effects on weed infestation showed the sowing of clover grass because it forms a closed cover of vegetation immediately after the mowing/mulching of the growth.
- At the end of each kind of land set aside the potential of weed sperms has increased, above all on areas with natural regrazing.
- The weed infestation of the following crops was clearly above the economic damage threshold; therefore, a weed control was carried out.
- Complete fallow contains the greatest risks of nitrate erosion.
- Natural regrazing is less suitable against erosion since the green cover often develops incompletely.

Jahn,R.: Überprüfung der Umweltverträglichkeit bei Flächenstilllegung, Institut für Bodenkunde und Standortlehre, Universität Hohenheim 1997.

The set aside programme should reduce overproduction in the first line. However, negative environmental impacts may occur simultaneously: washing out of nutrients, structural disadvantages, humus losses, increased efforts for the re-cultivation of set aside areas.

Waldhardt, Rainer: Flächenstillegungen und Extensivierungsmaßnahmen im Ackerbau – Flora, Vegetation und Stickstoff-Haushalt. Göttingen 1994.

Set aside of arable land has perceptible effects onto the number of plant species. The author examined the effects on such species which are threatened in its existence (so called Red Data Book). The analysis was conducted at 56 plots with different cultivation/maintenance measures. The effects of land set aside on the evolution of biodiversity was pursued during a three years period (1989 ff) in Niedersachsen.

Table: Share (%) of arable areas with existing plant species registered in the Red Data Book (see GARVE, 1993)

Typ of areas and cultivation	Plots number (n)	Share of plots with species registered in the Red Data Book “ (%)		
		Year 1	Year 2	Year 3
Several years land set aside				
- with natural regrazing	56 im 3 Jahr 44	50	48	55
- with specific seeds sown in spring	43	35	23	26
- with specific seeds sown in autumn	12	67	33	58
One year land set aside				
- with natural regrazing	11	36	9	
- with specific seeds	36	28	6	
Field margins				
- extensively cultivated	50	80		
- conventionally cultivated	25	24		
Conventionally cultivated control areas (for comparison reasons *)	30	6		

*) Conventionally cultivated areas, not set aside and located close to set aside areas.

On control areas with conventional agricultural production techniques in only 6 % of the cases (n = 30) plant species registered in the Red Data Book were found. On the other hand, this share was considerably higher on set aside areas:

- at approx. 50% in the case of several years set aside and natural grass regeneration,
- at 28 to 36% in the case of one year set aside.

If specific seeds were applied on set aside areas less species developed than in the case of natural regrazing. Obviously the seeds are more competitive and replace wildy existing plants to some extent.

The highest increase of the number of species threatened in its existence were found on extensively cultivated field margins. Even in case of conventional cultivation, on field margins the number of registered species was at about four times higher than on regularly cultivated arable areas.