1
00:00:23,420 --> 00:00:20,029
so much about the shuttle program is

2
00:00:26,210 --> 00:00:23,430
spectacular launches two spacewalks that

3
00:00:29,210 --> 00:00:26,220
it's easy to overlook the mundane though

4
00:00:32,030 --> 00:00:29,220
they seem Herculeah nat times astronauts

5
00:00:34,700 --> 00:00:32,040
in space are still bound by basic human

6
00:00:37,549 --> 00:00:34,710
needs fresh air clean water and

7
00:00:39,560 --> 00:00:37,559
nutritious fill my today bringing

8
00:00:41,690 --> 00:00:39,570
necessary supplies from Earth hasn't

9
00:00:44,540 --> 00:00:41,700
been a problem since the longest shuttle

10
00:00:46,940 --> 00:00:44,550
flight was ten days but now NASA is

11
00:00:49,250 --> 00:00:46,950
looking towards longer duration missions

12
00:00:52,459 --> 00:00:49,260
including a permanent orbiting station

13
00:00:54,260 --> 00:00:52,469

lunar base and trip to Mars where the

14
00:00:56,990 --> 00:00:54,270
costs of hauling all life's essentials

15
00:00:59,630 --> 00:00:57,000
would be prohibitive seeking

16
00:01:01,520 --> 00:00:59,640
alternatives scientists at the Kennedy

17
00:01:03,500 --> 00:01:01,530
Space Center are working to develop a

18
00:01:06,980 --> 00:01:03,510
control deck illogical life-support

19
00:01:10,929 --> 00:01:06,990
system ourselves where plants recycle

20
00:01:14,000 --> 00:01:10,939
air water and waste to produce food

21
00:01:15,800 --> 00:01:14,010
their effort is currently centered in an

22
00:01:22,550 --> 00:01:15,810
old pressure vessel salvaged from the

23
00:01:27,980 --> 00:01:24,590
it's called the biomass production

24
00:01:31,220 --> 00:01:27,990
chamber and in at KSC researchers are

25
00:01:33,890 --> 00:01:31,230
producing their first pilgrims every

26
00:01:35,330 --> 00:01:33,900
workers tend the small farm taking

27
00:01:37,970 --> 00:01:35,340
measurements and ensuring that

28
00:01:39,650 --> 00:01:37,980
everything is functioning properly the

29
00:01:41,990 --> 00:01:39,660
wheat is grown in an enriched

30
00:01:44,720 --> 00:01:42,000
water-based solution a process called

31
00:01:47,210 --> 00:01:44,730
hydroponics which eliminates the need to

32
00:01:49,850 --> 00:01:47,220
carry heavy potentially contaminating

33
00:01:51,950 --> 00:01:49,860
soil hydroponics offers another

34
00:01:54,500 --> 00:01:51,960
advantage as well according to the head

35
00:01:57,290 --> 00:01:54,510
of the project build not it's very easy

36
00:02:00,140 --> 00:01:57,300
to very quickly control exactly what the

37
00:02:01,970 --> 00:02:00,150
roots are seen computers are used to

38
00:02:03,490 --> 00:02:01,980

adjust the contents of the nutrient

39
00:02:07,820 --> 00:02:03,500
solution as well as atmospheric

40
00:02:09,859 --> 00:02:07,830
conditions in the chamber growing plants

41
00:02:12,440 --> 00:02:09,869
is only the first step in creating a

42
00:02:14,810 --> 00:02:12,450
complete life support system food

43
00:02:17,270 --> 00:02:14,820
processing crew habitation and waste

44
00:02:20,150 --> 00:02:17,280
management modules must all be developed

45
00:02:22,040 --> 00:02:20,160
that is our big challenge to really put

46
00:02:26,120 --> 00:02:22,050
it together and operate it as a system

47
00:02:29,450 --> 00:02:26,130
so that we can ultimately influence what

48
00:02:32,180 --> 00:02:29,460
happens in space in long period of time

49
00:02:34,660 --> 00:02:32,190
at Disney's Epcot Center near Orlando

50
00:02:36,770 --> 00:02:34,670
there's a pavilion called the land

51
00:02:39,710 --> 00:02:36,780
showcasing future agricultural

52
00:02:42,410 --> 00:02:39,720
technologies certainly growing plants in

53
00:02:44,360 --> 00:02:42,420
space is futuristic which is why there's

54
00:02:47,810 --> 00:02:44,370
a display featuring the research going

55
00:02:50,600 --> 00:02:47,820
on at Kennedy but ANBU sugar epcot

56
00:02:53,420 --> 00:02:50,610
senior plant pathologist is not just

57
00:02:55,880 --> 00:02:53,430
part of the exhibit he's investigating

58
00:02:58,700 --> 00:02:55,890
move diseases in hydroponic systems

59
00:03:00,470 --> 00:02:58,710
keeping the plants healthy is a critical

60
00:03:03,110 --> 00:03:00,480
concern and developing a life support

61
00:03:08,270 --> 00:03:03,120
system for astronauts thousands of miles

62
00:03:10,550 --> 00:03:08,280
for NASA Disney scientists also looking

63
00:03:13,850 --> 00:03:10,560

into the possibility of growing plants

64
00:03:16,100 --> 00:03:13,860
in lunar soil using earthly mineral

65
00:03:18,200 --> 00:03:16,110
deposit similar to those found on the

66
00:03:20,960 --> 00:03:18,210
moon they're trying to determine if

67
00:03:23,840 --> 00:03:20,970
lunar farms might be another alternative

68
00:03:25,880 --> 00:03:23,850
to resupply from Earth everything is

69
00:03:28,310 --> 00:03:25,890
open everything is possible and I think

70
00:03:31,070 --> 00:03:28,320
the more information we have on on

71
00:03:33,260 --> 00:03:31,080
different types of systems in the way to

72
00:03:35,330 --> 00:03:33,270
do things the better well we are and

73
00:03:37,220 --> 00:03:35,340
more intelligently we can make decisions

74
00:03:41,060 --> 00:03:37,230
to meet the specific mission

75
00:03:42,880 --> 00:03:41,070
requirements as they evolve lunar farms

76
00:03:46,090 --> 00:03:42,890
and control deck

77
00:03:48,040 --> 00:03:46,100
gical life support systems work aimed at